

Medicine and Surgery in the Great War 1914-1918



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MEDICINE AND SURGERY
IN THE GREAT WAR (1914-1918)

Cover Picture: The R.A.M.C. on active service; by H. R. Mackey.
From the original painting in the Museum of the Wellcome Institute.



MEDICINE AND SURGERY
IN THE GREAT WAR
1914-1918

AN EXHIBITION

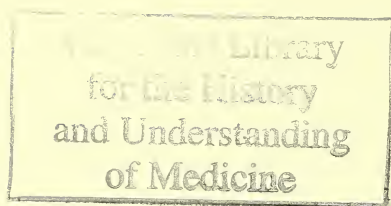
*to commemorate the 50th anniversary
of the Armistice*

11 November 1918

LONDON

THE WELLCOME INSTITUTE OF THE HISTORY
OF MEDICINE

1968



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N.B. This Exhibition is open daily to the public (except Sundays and Bank Holidays) from 10 a.m. to 5 p.m., free of charge.

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INTRODUCTION

The World War of 1914–1918 made greater demands on the medical services of all the nations involved than any other event in history. From a total of some 65 million people directly engaged in the war on both sides almost 8 million were killed and over 19 million wounded, nearly twice as many casualties as those suffered in the second World War. Under the pressure of this unprecedented demand the medical services responded by administrative reforms and scientific improvements which transformed the quality of their work. All official histories of the war pay tribute to the devotion, skill and courage of the medical services. To illustrate the record of all of them in a single exhibition would be repetitious and would require more space than is available. In this exhibition to commemorate the fiftieth anniversary of the Armistice on 11 November 1918 we give special attention to the British medical services, since the material readily available, especially the wealth of pictorial records, is mainly British. Any of the larger countries involved in the conflict could probably organize similar exhibitions from their own resources, but the message would be the same—that doctors, surgeons, nurses and all the medical auxiliaries made unparalleled efforts to respond to human needs and suffering of a character and scale that had never been imagined.

The general functions of the medical service, as laid down in Field Service Regulations, are “the preservation of the health of the troops; the professional treatment and care of the sick and wounded; the replenishing of

medical and surgical equipment; and the collection and evacuation of the sick and wounded.”

MEDICAL LOGISTICS:

What this meant in physical terms is illustrated by the following figures: In August 1914 the Royal Army Medical Corps (together with its Territorial Reserves) numbered less than 20,000, all ranks; in November 1918 the total had risen to 13,000 officers and 154,000 other ranks. In 1914 there were only 7,000 beds equipped for sick and wounded; in 1918 the total had risen to 364,000 in Britain alone and almost as many again in other parts of the Empire. This expansion was achieved only by erecting a large number of temporary hutted hospitals, as well as by requisitioning a great variety of buildings (ranging from private houses, council schools, asylums, fever hospitals and poor law infirmaries to the Examination Schools at Oxford and Trinity College, Cambridge). In the single month of May, 1915, the number of sick and wounded troops returned to this country from the Western Front totalled 42,000; in October 1916 it was 108,000, and in April 1918, 93,000. British casualties (including sick and injured) on all fronts totalled 11 million, and from all theatres of war more than 2.5 million were brought home for treatment. The organization of transport for such numbers was a major undertaking and included the provision of hundreds of thousands of stretchers (including the specially designed folding stretcher for use in the trenches), numerous fleets of motor ambulances, 63 hospital trains, 66 hospital ships, and 772 ambulance (sea)

transports. Many of those who were returned by these means for medical treatment recovered sufficiently to be sent back to the fronts and official statistics show that no less than 90 per cent of those treated were made fit for duty of some kind, but this figure includes many who became official casualties several times over. In Britain alone, compensation for death and disability was awarded in nearly 2.5 million cases, approximately 40 per cent of those who served.

PRESERVATION OF HEALTH:

The fulfilment of the first function of the medical service —‘the preservation of the health of the troops’ became increasingly difficult when the western front was immobilised in the extensive trenches dug in the ravaged land of France and Flanders. Much of the natural vegetation and land drainage over great areas was destroyed by heavy and frequent artillery bombardment so that soldiers on both sides found themselves living and fighting in a vast sea of malodorous mud where only micro-organisms dangerous to life and health flourished. No wonder that Sir Alfred Keogh, the Director-General of the Army Medical Service remarked that ‘in this war we have found ourselves back among the infections of the Middle Ages’. Conditions were such that many responsible medical officers feared the outbreak of epidemics as devastating as those of the Middle Ages. That they were in fact warded off was one of the greatest achievements of military hygiene and preventive medicine.

The experience gained in implementing the Public Health Act in England, where great emphasis was placed on the

provision of pure water supplies and efficient sanitation, together with the knowledge that stemmed from the rise of the new sciences of bacteriology and immunology, were now brought to bear on the problems of war and proved invaluable weapons. Thanks largely to the persistence of Sir Almroth Wright, who had been trying to press home the lessons of the South African War for more than a decade and had appealed in vain for the results of his experimental work on preventive vaccines to be officially accepted before the outbreak of war, the troops were protected against many of the dangerous infections to which they were exposed. Vaccines and sera were produced on a vast scale; the official statistics reveal that over 23 million doses of vaccine for the typhoidal infections alone were supplied, with more than 7 million for cholera, as well as over 11 million doses of anti-tetanic serum and 250,000 for diphtheria. The incidence of other infections was kept at a relatively low level by frequent and elaborate delousing and by strict prophylaxis (especially for the venereal diseases) enforced with military rigour. The results more than justified all the scientific and administrative effort that was involved.

The spread of the war to areas other than western Europe had not been anticipated and the campaigns in the Dardanelles, Macedonia, Mesopotamia, Palestine and Egypt, and East and South-West Africa brought new problems to the medical services. The British Mediterranean Expeditionary Force in Gallipoli totalled about 163,000. Of this number nearly 115,000 were lost as battle casualties, with nearly 40,000 killed or missing, but the number of

admissions to hospital for sickness or injury was almost twice as large as that of the whole force, a figure which gives us some idea of the strain upon the medical services. Prominent among the diseases treated was dysentery, which was so widespread that it was made the subject of a special investigation by the Medical Research Committee.

In the British Salonika Force on the Macedonian front malaria made great inroads on the numbers fit for service. Non-battle casualties were more than 20 times as many as those killed or wounded and accounted for 502,000 of the 550,000 engaged in the whole campaign. It was impossible to apply systematically the routine preventive measures for mosquito control developed by Ross and others and great reliance was placed upon quinine, which was not always available in sufficient quantities. In Mesopotamia the medical situation was equally daunting. Sanitary conditions were bad and the troops were without the necessary appliances, materials and chemicals for ensuring a safe water supply or for preventing outbreaks of water-borne diseases. Lines of supply and communication often broke down and the medical units were too few to cope with the great numbers of sick and wounded. On a personal visit of inspection Sir Victor Horsley (who met his own death there) described the conditions as 'grossly insanitary and inhuman'. Here the non-battle casualties were 820,000 (against 85,000 killed and wounded) in a force which reached its peak of 411,000 in 1918.

The position in Egypt, which had long been familiar as a base to British forces, was rather better, but even

there and in Palestine malaria and dysentery were responsible for a large proportion of more than 500,000 sick admissions. It was in German East Africa however that the highest rate was recorded, with non-battle casualties more than thirty times the number of those killed or wounded (approx. 330,000 to 10,000). General Smuts described it as a 'campaign against nature, in which climate, geography and disease fought more effectively against us than the well trained forces of the enemy'.

CARE OF THE SICK AND WOUNDED:

The second of the service's functions—'the professional treatment and care of the sick and wounded' was, after many initial difficulties, fulfilled to such a degree that, as the statistics show, millions of men were returned to active service after treatment, an achievement that was a positive and massive contribution to the war effort. Military surgeons at first had no previous experience to guide them in the treatment of severe injuries of the type inflicted on the western front. Injuries from explosive missiles and shrapnel, mines and hand-grenades were complicated by contaminated material—mud and portions of badly soiled clothing—which were driven into deep wounds. Listerian methods were found to be ineffective against such infected wounds and new types of treatment were investigated. Almroth Wright set up in Boulogne a research centre to study this problem and with the help of a group of assistants (which included Alexander Fleming) he showed that a 'physiological method of treatment' was far superior to the accepted use of caustics. They demonstrated that fresh pus

could overcome infection and that the number of protective leucocytes could be increased by the use of a concentrated saline solution in the wound. The iodine ampoule which had been a standard component of the first field dressing was withdrawn and some regimental surgeons even used salt packs to protect open wounds until proper surgical treatment could be given. The technique finally adopted was that which was introduced by Alexis Carrel of the Rockefeller Institute in which very fine tubes ('Carrel-Dakin' tubes) were inserted into the depths of the wound and through them the wound was continuously irrigated by a solution of sodium hypochlorite. For more superficial wounds new surgical antiseptics such as flavine and dichloramine were developed. None of these new methods was of avail against the novel complication of 'gas-gangrene', caused by infection of the wound with *Clostridium welchii* from the heavily infected soil of the trenches, and here only amputation and debridement (the cutting away of infected tissue and foreign material) had any chance of arresting its progress.

Maxillo-facial injuries and extensive burns demanded new skill and ingenuity from the surgeon, and the war gave a great impetus to the development of plastic surgery, in which Sir Harold Gillies was the acknowledged leader. Orthopaedic surgery also made great advances. Already established as a progressive branch of scientific surgery by Hugh Owen Thomas and Sir Robert Jones, it not only saved many lives (especially by the widespread use of the 'Thomas splint') but helped to return many badly injured men to an active and useful life. Over 1.5 million splints were issued to the British forces during the war.

The new science of radiology also had its first great test in war and no less than 528 X-ray outfits (of which 14 were mobile) were employed in examining fractures and locating fragments of shell or shrapnel which had penetrated the body. For extracting such fragments from the eye a new type of giant magnet was developed which has since proved of great value in industrial injuries of this kind.

GAS WARFARE:

The use of poison gas, which began on 22 April 1915, when chlorine gas was released from the German front lines near Ypres, was a menace against which no protection was at first available, or even known. All that could be done in the immediate aftermath of the attack was to issue the troops with pads of cotton waste wrapped in muslin and soaked in hyposulphite solution which they were to hold over mouth and nostrils when the gas came. These were copied from similar protective pads found in the possession of captured German troops. Chemists, specialists in respiratory disorders and even physiologists were at once set to solving the problems of protection and treatment. Two research laboratories were established and within three months the first gas masks, containing materials which made the gas inert, were issued. Later models were greatly improved and before the end of the war some 27 million gas masks were made for British and some allied forces. Special first aid centres, clearing stations and a base hospital were reserved for the reception and treatment of casualties from gas attacks, which were later extended to include such lethal gases as phosgene and mustard gas. The total casualties from gas warfare were 185,000—9,000 of which were fatal.

RESEARCH INTO OTHER PROBLEMS:

Other novel types of warfare, employing tanks and aircraft for the first time, brought other novel medical problems and the early developments in what has come to be called 'aviation medicine' are recorded in the official history. The most widespread effects followed the submarine blockade which denied to Britain not only arms from the United States but also the food which was essential for the health of its civilian population. There is no doubt that the peoples of the warring nations suffered from malnutrition, a situation which helped to develop more rapidly than might otherwise have been possible the new science of nutrition launched by Gowland Hopkins, Casimir Funk and others in the years before the outbreak of war.

The investigation of many of these problems was organized by the recently formed Medical Research Committee—a by-product of the National Health Insurance Act of 1911—which reported on the dietaries of munition workers in 1917. Its other early reports included one on the epidemics of cerebro-spinal fever among the Forces in 1915 and 1916, on dysentery cases returned from the eastern Mediterranean fighting, and on the epidemiology of phthisis in the civilian population at home.

THE MEDICAL HISTORY OF THE WAR:

It is interesting to recall that the Medical Research Committee also played a great part in the official Medical History of the War* which must always be the chief source of information for all who are interested in the subject.

**History of the Great War based on official Documents* edited by Major-General Sir W. G. Macpherson (and others): *Medical Services*, 12 vols, London, H.M.S.O. 1921-31.

The preparation of the History, as well as of a Medical War Museum was first proposed to Sir Alfred Keogh in the autumn of 1914 by Sir William Osler, who had received the suggestion from Professor J. G. Adami of McGill University, Montreal. A small committee was formed which included, as well as Osler himself, Sir Walter Morley Fletcher, Sir Wilmot Herringham, Sir William Leishman, Col. T. R. Elliott and others, and the work of collection and documentation went on throughout the war. When Osler died in December, 1919, his place was taken by Sir Andrew Balfour, Chief Director of the Wellcome Bureau of Scientific Research, which had been put at the government's disposal for research into the medical problems of the war, especially in the field of tropical medicine and hygiene.

Elliott was responsible for collecting in France a great number of pathological specimens and was given the services of two artists to make drawings of wounds and injuries. This material was sent to the Museum of the Royal College of Surgeons of England, where Sir Arthur Keith, assisted by Sir John Bland Sutton and Professor C. E. Shattock, carried out the task of organizing it into a valuable study collection. Unfortunately, all the specimens in this collection were destroyed when the Royal College of Surgeons was bombed during the second World War, but the series of drawings and paintings by Henry Tonks have been preserved and I am indebted to Sir Hedley Atkins, President of the College, and to Dr. R. Sichel, Curator of the Pathological Museum there, for permission to borrow a selection of these for the exhibition.

A large public exhibition on the history of the war was organized by the Imperial War Museum at the Crystal Palace in 1918, but only a part of this was devoted to the medical services and much of the medical material, with paintings and photographs, was presented, when the exhibition closed, to the Wellcome Museum. The remainder was retained as a small but permanent medical section of the Imperial War Museum, where certain items have been included in the general exhibits open to the public. A few of these have also been kindly lent for the present exhibition, which is believed to be the first comprehensive and public exhibition devoted entirely to the work of the medical services and to the developments in medicine and surgery during the Great War.

THE WELLCOME COLLECTIONS ON THE WAR:

When Wellcome accepted the gifts mentioned above, he was already planning for his Museum a large section on the history of War Medicine in all periods and had made considerable acquisitions to illustrate earlier wars and campaigns. His attempts to secure specimens of every item of medical equipment used during the Great War were, however, frustrated by the fact that at that time they were still the standard issue and were returned to stores depots for possible future use. This consideration did not apply to captured material, and this is well represented in the Museum. He was successful, however, in building up a substantial pictorial record in the form of paintings and drawings by official war artists as well as the original paintings, drawings or photographs commissioned for illustrations in the magazines and newspapers of the period. Those on

view in the exhibition are a selection of the best of these. Also well represented is the literature of the time dealing with the medical and surgical problems encountered in the war and it will be seen that military necessity gave the spur of urgency to the acquisition of new knowledge and new techniques which have been of permanent value.

ACKNOWLEDGEMENTS:

The greater part of the material included in the present exhibition is from the Wellcome collections. Some items to fill gaps in those collections (apart from those already mentioned) have been very kindly lent by the R.A.M.C. Historical Museum, the Royal Army Medical College, the Museum of Queen Alexandra's Royal Army Nursing Corps, the Museum of the Royal Army Dental Corps, and the libraries of the Royal Society of Medicine, the British Medical Association, the Royal College of Surgeons, University College, London, and the Manchester University Medical Library. Among many individuals who have given practical help and advice I offer my grateful thanks to Lieutenant-General Sir Robert Drew, Director-General of Army Medical Services, Major-General Talbot, Commandant of the Royal Army Medical College, Colonel J. T. Moore, Colonel B. M. Robertson, R.R.C., of Queen Alexandra's Royal Army Nursing Corps, Mr. Peter Simkins, Keeper of Exhibits, the Imperial War Museum, and Mr. M. Davies, Librarian, Royal Army Medical College. In the preparation of the exhibition I have also been greatly assisted by Mr. J. W. Barber-Lomax, Mr. E. Gaskell, Mr. J. K. Crellin, and Mr. John Hanington.

F. N. L. POYNTER,

November 1968

Director,

Wellcome Institute of the History of Medicine

THE MEDICAL SERVICES OF THE BRITISH ARMED FORCES

1. Portrait of Lt.-Gen. Sir Alfred Keogh, Director-General, Army Medical Services 1905-10, and 1914-18. 2 x 1.3 m. *R.A.M.C. Millbank.*
2. Portrait of Lt.-Gen. Sir Arthur Sloggett, a Director-General, Army Medical Services 1914-18. 2 x 1.3 m. *R.A.M.C. Millbank.*
3. The Royal Army Medical Corps, after a rather ignominious beginning as a 'Hospital Conveyance Corps' in the Crimean War, passed through various phases until it was formally founded in 1898.

The war efforts of the Corps are specially commemorated by bronze plaques with relief scenes of the R.A.M.C. in action. These were 'erected in appreciation of devotion to duty of the Royal Army Medical Corps and of the services in relief of suffering in the Great War. The cost was deployed out of funds generously placed at the disposal of King George V by Major W. N. Keefer of Toronto late Indian Medical Service 1917.'

R.A.M.C. Millbank.
4. R.A.M.C. bearer supplying water, by H. R. Mackey, 1919. Oil. 60 x 50 cm.
5. Portrait of an R.A.M.C. private, by H. R. Mackey [?], 1915. Oil. 51 x 41.7 cm.
6. The R.A.M.C. on active service, by H. R. Mackey. Oil. 2.62 x 5.90 m.
7. R.A.M.C. lifting a wounded man from trench, by G. Rogers. Oil. 3.03 x 3.03 m.
8. Trench under fire; wounded attended by R.A.M.C., by C. Cuneo. Oil. 33 x 20.4 cm.
9. R.A.M.C. attending wounded, 1916, by F. Dadd. Grey wash. 39.5 x 63.9 cm.
10. Battle scene with R.A.M.C. removing wounded, by D. MacPherson, 1917. Wash. 44.7 x 70.4 cm.
11. Work of the Royal Army Medical Corps, by F. Matania. Grey and brown wash. 31 x 47 cm.

12. Plaster group of two R.A.M.C. bearers carrying wounded soldier on a bandy chair. Ht. 60 cm.
13. Bronze figure of R.A.M.C. bearer carrying wounded man on back. Ht. 71 cm. *R.A.M.C. Millbank.*
14. An R.A.M.C. Colonel's dress uniform. *Mr. John Hanington.*
15. Uniform of R.A.M.C. private.
16. Dinner in honour of the R.A.M.C.'s services during the War. Menu and speeches, including those of W. Churchill, Earl Haig and Sir Edward Ward. Special tribute was paid to Director-General Sir Alfred Keogh (see exhibit 1). *R.A.M.C. Millbank.*
17. Bowlby, Sir A., Papers and reprints of articles. 1914-18. Major-Gen. Bowlby was consulting surgeon to the British Expeditionary Force. *R.A.M.C. Millbank.*
18. Burchaell, Sir C., Miscellaneous documents. These exceptionally interesting papers contain reports, sometimes critical, of medical arrangements in France. One file relates to a Court of Enquiry into a battalion's failure, through alleged shellshock, to carry out a raid. *R.A.M.C. Millbank.*
19. Cantlie, Sir J., War diary, 1916. Written on regulation forms. Gives an almost blow-by-blow account of incidents in the front line. *R.A.M.C. Millbank.*
20. Shield, H., *War Diary, 12 August-25 October, 1914*. A dramatic account of the retreat from Mons. The author, a medical officer, was killed on 26 October. His diary was privately printed. *R.A.M.C. Millbank.*
21. Boyd-Orr, 1st baron, *As I recall*, London, Macgibbon & Kee, 1966, R.A.M.C. and Naval service.
22. Herringham, W., *A Physician in France*, London, Arnold, 1919. Major-General, consulting physician to the Forces overseas.
23. Paget, S., *Sir Victor Horsley*, London, Constable, 1919. Sir Victor Horsley was a consultant to the Expeditionary Force in Egypt and Mesopotamia.
24. Jeans, T. T., *Reminiscences of a Naval Surgeon*, London, S. Low, 1927. Surgeon-Rear-Admiral on hospital ship in Turkey.

25. Muir, J. R., *Years of Endurance*, London, P. Allen, 1936. Surgeon Rear-Admiral, naval hospital in England and on naval ships near Britain and the North Sea.

The unflinching service of army nurses in the war is exemplified by two uniforms and the bust and mementoes of Edith Cavell. When the war broke out she was matron of Dr. Depage's Training School for Nurses in Brussels' Barkendalle Medical Institute; the Germans allowed her to continue her work and the Institute became a Red Cross Hospital at which German and Allied wounded were treated. She was executed on the 12 October 1915 for aiding the escape of Belgian, French and British troops.

26. *Uniforms associated with Queen Alexandra's Royal Army Nursing Corps.*

(a) Uniform worn by Dame A. L. Still, when matron of 5th London General Hospital, T.A. Full-length walking-out dress with red cuffs and cape. Long over-cape.

(b) Grey uniform with full white apron. Stiff collar belt and cuffs. Instrument pouch hung from belt, containing 1 pair forceps, 1 scoop, 1 thermometer, 1 pair scissors, 1 probe, 1 spatula.

Queen Alexandra's Royal Army Nursing Corps.

27. Bust of Edith Cavell. Ht. 87 cms.

28. A collection of letters and photographs on the life and death of Edith Cavell. *Imperial War Museum.*

- 28a. Edith Cavell's autograph signature on the title-page of *The Book of English Trades*, London, R. Phillips, 1816.

29. Clarke-Kennedy, A.E., *Edith Cavell*, London, Faber & Faber, 1965.

Naval Nursing is represented by exhibits 30, 31 and 31a.

30. Portrait of a superintending sister of Queen Alexandra's Royal Naval Nursing Service, by O. Moser, 1919. Water colour. 30 x 19.4 cm.

31. Portrait of Miss K. M. Hickley, R.R.C., Head Sister, Queen Alexandra's Royal Naval Nursing Service. Coloured photograph 29.8 x 24.5 cm.

- 31a. Photographs featuring the work of the Royal Naval Nursing Service.

32. Plaster figure of nurse attending wounded officer. Ht. 46.5 cm.

33. Cabinets of nurses' and surgeons' medals (German, Bavarian, and Austro-Hungarian). *Mr. John Hanington.*
34. Clothing and equipment belonging to Dr. Elsie Inglis whose invaluable war contributions resulted largely through her work for the Scottish Women's Hospital. *Imperial War Museum.*
35. Women's Sick and Wounded Convoy Corps. Mrs. St. Clair Stobart founded the Corps in 1907, a voluntary organization of women doctors, nurses and orderlies. Her great work, especially in the Serbian campaign, is illustrated by photographs and mementoes. *Imperial War Museum.*
36. Wounded Russian woman discovered in a male battalion, by F. Matania. Grey wash. 31.3 x 25.5 cm.
37. The Light House of the Battlefield—Red Cross First Aid Post, by P. Thiriat, 1918. Grey wash. 38.2 x 60.5 cm.
38. Red Cross resuscitating and bandaging wounded, by 'H. C.' Oil. 44.5 x 54.5 cm.
39. Certificate awarded by the French Red Cross to Dr. J. B. Aldrich-Blake for her services to France.
40. Bavarian Sister's Red Cross case with instruments. *Mr. John Hanington.*
41. Blackham, Col. J., *Scalpel, Sword and Stretcher*, London, S. Low, 1931. Red Cross, St. John's Ambulance, Campaigns in France and Italy.
42. Bucher, W. E., *Surgeon Errant*, Los Angeles, Angeles Press, 1935. American Red Cross Mission in Siberia 1918-1919.
43. Service, R. W., *The Rhymes of a Red Cross Man*, London, 1916. War poetry written by the 'Canadian Kipling' and dedicated to the memory of his brother killed in action the same year.

THE PRESERVATION OF HEALTH

44. Stretchers, rations and water for the front, by H. R. Mackey. Oil. 2.05 x 3.66 m.
45. The problem in providing water supplies is shown in the series of photographs of a motor water-cart, a pump guarded by a soldier, and water markers.

46. Photographs of water sterilization.
47. The Horrock's Box. This famous box was used for water purification (by chlorination) by every unit of the British, Dominion and Colonial Forces in the two World Wars. It was devised by Colonel Sir William Horrocks, the father of Lt.-Gen. Sir Brian Horrocks.
R.A.M.C. Museum, Aldershot.
48. Photographs of latrines, and incinerators for refuse and excreta.
49. Examples of German and British antiseptics and disinfectants, mostly based on phenol or phenolic compounds. The War saw the introduction of substances such as Dakin's solution and eusol.
50. The large quantities of vaccines and sera used are shown in the table taken from the *Official History of the War*. Also exhibited is a selection of German vaccines.
51. Collection of amulets and charms worn by the troops. These range from swastikas to a lucky five or pentad.
52. Somerville Asiatic body cord: In the trench warfare of 1914-18 the louse was a great problem, not only for its nuisance and bites, but because it carries some kinds of typhus and relapsing fever. As no residual insecticides or antibiotic drugs were available, some unusual remedies were invented. In addition to the famous 'Keatings Powder,' Somerville's body-cord was developed from an Indian folk-medicine device. A cord of wool was made from three strands of 4-ply plaited together, and impregnated with a mixture of 2 parts of mercury ointment and 1 part of yellow bees-wax. Maximum production was about 120,000 per annum.
R.A.M.C. Museum, Aldershot.
53. Advertisements published in 1917 for 'The Winter Trenchman Belt' (to protect against body vermin and chill) and for 'Maw's Antiverm Trench Powder.'
54. Mosquito netting and spray of the types used during the war.
55. Samples of quinine from British and German medicine chests.
56. Helmets and masks:
 - (a) Steel helmets were first introduced during the early months of the first World War. Their life-saving properties are well illustrated by this specimen which is from the collection of the late Maj.-Gen. Sir Anthony Bowlby.

Sir Anthony's note on the label reads as follows: 'the owner of this helmet had only a single scalp wound although the helmet had been hit in six or seven places.'

R.A.M.C. Museum, Aldershot.

(b) French Red Cross Helmet.

- 57. Anti-flash and anti-splinter masks of the types shown were issued early in 1915.
- 58. Poisonous gas attacks on the Canadians in Flanders, 24 April 1916, by L. Raemaekers. Watercolour. 37.4 x 27 cm.
- 59. British trench anti-gas rattle. *Mr. John Hanington.*
- 60. A bell from a French church, found in a German trench in use as a gas alarm.

British gas masks: The first German gas attack, on 22 April 1915, immediately initiated arrangements for providing protection by the use of simple face masks moistened with sodium bicarbonate or even urine. Thus began the production of many millions of gas masks ranging from this simple face mask to the more effective box respirator needed to combat the increasing use of more potent gases. Examples of the three basic types of masks are shown.

- 61. Face mask (to cover the mouth and nose, and generally the eyes). Exhibited is the mask which came into general use (the 'veil respirator'). This was merely a gauze bag containing a pad of cotton waste soaked in a solution of sodium hyposulphite and sodium carbonate.
- 62. Examples of other simple face masks which include 'Maw's Chemical Mask for Poisonous Gases'.
- 63. The helmet type. Early in 1915 the helmet, which tucked into the tunic, began to replace the 'veil respirator.' As can be seen from the exhibits, the helmet underwent a number of modifications largely introduced to combat phosgene which replaced or supplemented chlorine and lachrymatory gases. The modifications included the use of a one-way valve to allow exhalation through the bag, and impregnation of the hood with the chemicals sodium phenate and hexamine.
- 64. Photographs of the production of helmets at John Bell, Hills & Lucas in 1915-1916. *Pharmaceutical Society of Great Britain.*

65. The box respirator. This began commercial production in June 1916 and remained in use until the end of the War. The absorbent material, in the box, consisted of granules of lime and sodium permanganate, and of charcoal.
66. Photographs of the production of box respirators at John Bell, Hills & Lucas, and posters reminding workers of the great care needed in the production of the masks, emphasize the important contribution of women to this phase of the War.
Pharmaceutical Society of Great Britain.
67. Colebrook, L., *Almroth Wright, Provocative Doctor and Thinker*, London, Heinemann Medical Books, 1954. Anti-typhoid vaccine supplied to British, French, Belgian, and Serbian Armies. Blood transfusion, serum therapy.
68. Cope, Sir Z., *Almroth Wright, Founder of Modern Vaccine Therapy*, London, Nelson, 1966.
69. Various R.A.M.C. training manuals and 'manuals' of military hygiene.
Mr. John Hanington.
70. *Notes for Sanitary officers. British Expeditionary Force in France*, London, H.M.S.O., 1917.

ORGANIZATION FOR CARE OF THE WOUNDED

This section is concerned principally with the transportation of the wounded, and with Casualty Clearing Stations and Base Hospitals etc. The pictures which have been chosen illustrate vividly the wartime conditions and problems.

71. Diagram of the many stages in the journey of a soldier wounded on the front, from Regimental Aid Post to Hospital Ship.
72. Evacuating wounded on Menin Road, 1917, by D. A. Baxter. Watercolour. 59.4 x 123.6 cm.
73. Cossacks bringing in wounded, 1916, by F. de Haenen. Grey wash. 37.4 x 64.8 cm.
74. R.A.M.C. Ambulance on the march in France, by W. Hatten. Grey wash. 34.4 x 58.8 cm.
75. Collecting wounded from trenches, 1917, by L. Jonas. Wash. 38 x 63 cm.

76. Red Cross train loading up at Casualty Clearing Station, 1917, by Sir D. Lindsay. Grey wash. 31 x 43 cm.
77. Horse and stretcher transport, by Sir D. Lindsay. Grey wash. 40 x 33.6 cm.
78. Horse ambulance at Ypres, by Sir D. Lindsay. Grey wash. 35.4 x 53.2 cm.
79. Battered but Victorious (the less severely wounded assist comrades and erstwhile enemies support each other), by F. Matania. Wash. 33.6 x 23.7 cm.
80. Removing wounded on horse-drawn sledges, by F. Matania. Grey wash. 35.6 x 25.6 cm.
81. Transport of the dead and wounded by motor ambulance, by G. Rogers. Oil. 44.4 x 75 cm.
82. Relay Post at Ginchy, by A. O. Spare. Watercolour. 62.5 x 100.2 cm.
83. Transport of casualties along bombed gas works, by W. E. Spradbery. Watercolour. 50 x 64.7 cm.
84. Stretcher-bearers in front of bombed church, by W. E. Spradbery. Watercolour. 53 x 70 cm.
85. Transporting the wounded by aerial trolley in the Alps 1917, by 'Ugo'. Grey wash. 36.2 x 53 cm.
86. Transporting the wounded from bombed town, by 'Ugo'. 1916, Grey wash. 49.5 x 74.5 cm.
87. Transporting the wounded in Russia, showing a naval cot placed on a sleigh drawn by mules (anon.). Oil. 44.7 x 60.4 cm.
88. Four men carrying stretcher (anon.). Oil. 52 x 72.8 cm.
89. Photographs of stretcher-bearers in action. Note the various types of stretchers such as the Brooke-McCormack and Roger's trench type.
90. Photographs showing transportation by hospital ship and barge.
91. Photographs showing transportation by railway.

92. Photographs of a wide variety of transportation methods (other than those shown in exhibits 89-91). These include walking, aeroplane, dog and horse sleigh, camel, mule, and hand trolley.
93. An Advanced Dressing Station at the roadside, 1917, by F. Barraud. Oil. 53.8 x 39 cm.
94. The House of God as a Hospital, a sketch made at the front, by G. Holiday. Water colour. 27.7 x 22.1 cm.
95. Wounded at a Casualty Clearing Station, by Sir D. Lindsay. Wash. 34.2 x 48 cm.
96. A Casualty Clearing Station at the French front, by Sir. D. Lindsay. Wash. 33 x 48 cm.
97. Group of casualties in a room under a gas lamp, 1919, by G. Lipscombe. Oil. 87.1 x 112 cm.
98. German beds in a lace factory at La Cateau, by J. H. Lobley, 1918. Oil. 40 x 47.2 cm.
99. An Advanced Dressing Station at the Western Front (once Contral-maison Château), by F. Matania. Watercolour. 33.2 x 51.4 cm.
100. The care of a wounded war-horse in Northern France, by F. Matania. Brown wash. 31 x 49.3 cm.
101. Entrance to a Dressing Station: arrival of wounded (on the right are prisoners), by S. E. Scott. Grey wash. 17.5 x 28.1 cm.
102. An Advanced Dressing Station—once Contralmaison Château, by A. O. Spare. Watercolour. 83 x 108.4 cm.
103. Bristol Red Cross Hospital, by W. E. Spradbery. Watercolour. 42 x 54.2 cm.
104. Advanced Dressing Station (anon.). Grey wash. 35.1 x 54 cm.
105. Series of photographs of Collecting Posts and Advanced Dressing Stations.
106. Photographs of hospital tents, and hospital wards in Baghdad, Cairo, Lucerne, and other places, showing the wide range of temporary measures which had to be employed.

107. Model of no. 55 General Hospital, B.E.F. France. Mobilized 1917. Landed in France. First patients admitted 1917.
R.A.M.C. Museum, Aldershot.
108. Diorama of Advanced Dressing Station, Contralmaison Château. This model shows the Château from the German lines. The elaborate dug-outs beneath the Château were constructed by the Germans, but fell into the hands of the British in their advance in July 1916, and together with the cellars of the Château became an Advanced Dressing Station (cf. exhibit 102).
109. Bronze group of camel with stretchers and driver. Ht. 60 cm.
R.A.M.C. Millbank.
110. A selection of stretchers which include (a) the Neil Robertson stretcher which allowed the removal of a patient from small confined spaces with the minimum of danger and discomfort; (b) a bamboo stretcher sometimes used in conjunction with the Neil Robertson; (c) Roger's trench stretcher, and (d) a general service type.
111. Stretcher-Bearers' Candle Lamp: These candle lamps were included in field medical equipment up to and including the first World War. The sharp hooks were designed to attach the lamp to the clothing thus enabling the stretcher-bearer to have both arms free for carrying the stretcher and tending the wounded.
R.A.M.C. Museum, Aldershot.

Hospital supplies and administration

112. List of drugs used in the Bavarian Field Hospital no. 47.
113. List of pharmaceutical appliances used in Bavarian Field Hospital no. 47 of the 14th Division, dated 1 April, 1917.
114. Claim form for cost of medical and surgical equipment from a German military hospital.
115. Form for admission to a German military hospital.
116. Note book from a German field hospital.
117. German field postcard for use of patients in hospital.
118. German military hospital register forms.
119. Register recording patients received and discharged at a German naval hospital.

120. Medical History sheet used in the German Army.
- Books and articles*
121. Beatson, Sir G. T., *How the Wounded are Cared for in War*, Glasgow, 1916. An exhibition to show the work of a casualty clearing station.
122. Swindell, G. H., Diary in the author's own hand. 1914-18. 3 vols. Life with the 77th Field Ambulance (25th Div.). The author was batman, mess-waiter and stretcher-bearer.
123. Walker, H. F. B., *A Doctor's Diary in Damaraland*, London, E. Arnold, 1917. The story of a mounted Brigade Field Ambulance with Gen. Botha in 1915.
124. Bale, G. A., *The Birth and Early Days of our Ambulance Trains in France, August, 1914*, London, Bale, 1922.
125. Gosse, Philip, *Memoirs of a Camp Follower*, London, Longmans, 1935. Life as a Medical Officer on the Western Front and in India.
126. Personal diaries of an ambulance driver. *Mr. John Hanington.*
127. Colt, G. H. The evolution of the jointed-pole trench-stretcher. [Autograph letters, photographs and sketches, and reprint of article from the *Lancet*, 1916, i, 202-7]. The difficulty of designing a stretcher which would negotiate the twists and turns of front-line trenches was never really overcome during the war. Colt was one of many who tried to find a solution. *R.A.M.C. Millbank.*
128. Dunning, *Colonel*. Documents relating to the Dardanelles Campaign. The 2nd Lowland Field Ambulance.

MEDICAL AND SURGICAL EQUIPMENT

129. British and German field medical panniers. These chests were equipped with a wide variety of medicines and apparatus such as that for administering saline infusions. 60 x 40 x 40 cm.
The tablet boxes in the British panniers included the famed 'number 9s'. Examples of the latter, prepared by Burroughs Wellcome & Co. and Parke, Davis & Co., are shown by courtesy of the *R.A.M.C. Museum, Aldershot* and *Mr. W. H. Boorman.*
130. British saddle medicine chests. *Imperial War Museum.*
131. British and German medicine packs, haversacks, belts, and pouches.

132. German steel medicine case. *Mr. John Hanington.*
133. Turkish medical pack.
134. A selection of dressings including the well-known sphagnum moss absorbent dressing (see exhibit 135), and examples of German surgical dressing substitutes.
135. Hotson, J. W. (a) *Sphagnum as a Surgical Dressing*, Northwest Division of the American Red Cross [1918]; (b) 'Sphagnum from Bog to Bandage', *Publications of the Puget Sound Biol. Station, Univ. Washington*, 1919, 2, 211-47. A shortage of absorbent cotton necessitated the widespread use of peatmoss, or sphagnum, as a standard dressing in war hospitals.
136. The variety and large numbers of splints purchased for the armed services is shown in the table from the *Official History of the War*. The selection of wooden and metal splints exhibited (for arms, legs, hip and wrist) includes types mentioned in the list, e.g., Thomas' and Jones' splints.
137. Field anaesthetic apparatus:
The official minimum outfit for an operating theatre in a Military Hospital was 3 and 4 oz. drop bottles, Guy's tongue forceps, 2 forceps or holders for sponge, 2 mouth gags, ether apparatus (which could be adapted for nitrous oxide), chloroform inhaler, 2 Schimmelbusch's masks, oxygen cylinder and fittings, and 2 mouth props.
138. British surgical field panniers. 74 x 34 x 36 cm.
139. German surgical haversack.
140. German operating gloves of rubberised cotton (a substitute for rubber).
141. Taylor's Electric [i.e. Magnetic] Bullet forceps. This unusual apparatus was invented in 1865, but was still in use during the war.
142. A selection of temporary fibre and papier mâché artificial limbs produced during and just after the war. These include stumps for mid and high thigh, and lower leg amputations. (*cf.* also exhibit 263).
143. Wooden crutches with fixed and adjustable handles.
144. Photographs of mobile bacteriological laboratories manufactured and designed by Baird & Tatlock (London) Ltd. *R.A.M.C. Millbank.*

145. Photographs of motor bacteriological laboratory presented to the War Office by Sir Henry Wellcome.

Radiology

At the outbreak of war in August 1914, both the British and the French armies still relied on X-ray equipment long out of date. Some of it had even been used in the Boer War. Organizationally, too, there were grave deficiencies, made worse by the general lack of respect within the medical profession for radiology as a specialty.

So far as apparatus was concerned Britain was at a peculiar disadvantage in that she was entirely dependent on German suppliers for the glass which went into X-ray bulbs. With time this grave deficiency was made up by our own native manufacturers and by imports from America and France.

Experience of radiology in war conditions did not significantly advance civilian practice, although improvements were made in the techniques applied to the diagnosis of diaphragmatic hernia, gas gangrene and tropical liver abscesses. Localization of foreign bodies was also made much easier.

A selection of articles is exhibited to give an overall view of the conditions under which radiology took place on the war fronts.

146. Goulesbrough, C., 'A few notes on military radiography in the English hospitals in France, during the first nine months of the war', *J. Roy. Army. Med. Cps.*, 1915, **25**, 239-43. The author recommends the widespread use of portable apparatus for the more serious type of injury. He also describes methods of localizing bullets in the body, and refers to a front-line mobile X-ray unit presented by Cheltenham Ladies College.
147. Mayo-Robson, A. W., 'Radioscopy with the third French Army', *Lancet*, 1915, **i**, 906-8. Description of a method, devised by the Frenchman Dr. Havet, for localizing projectiles in the body. The French army had a very effective system of motor ambulances in which the X-ray equipment was operated from dynamos.
148. Charlier, A., 'Les services radiologiques aux armées pendant la guerre actuelle', *Arch. Méd. Pharm. milit.*, 1917, **67**, 638-51. Organization of X-ray work in the French Army. Medical personnel were specially trained at the Val-de-Grâce whilst technical workers underwent courses in some of which Mme. Curie took part.
149. Head, H. C., 'A mobile X-ray waggon unit', *Proc. R. Soc. Med.*, 1917-18, **11**, Sect. elect. ther., 56-7. Short description of an X-ray unit constructed on an Austin motor-lorry.

150. Coffin, W. K., 'Bedside radiography, with a new portable X-ray apparatus; the Army bedside X-ray unit adapted as a portable apparatus for civilian practice', *Boston med. surg. J.*, 1919, **181**, 431-34.
151. Kaye, G. W. C., 'X-rays and the war', *J. Röntgen Soc.*, 1918, **14**, 2-17. Presidential address containing a strong appeal to the British X-ray industry to emulate the Americans. Reference is made in passing to the basic work in physics and crystallography of Rutherford and the two Braggs.
152. Cotton, W., 'Three years' radiography at the base in France', *Practitioner*, 1920, **105**, 280-91. An account with statistics of work in four base hospitals. The emphasis, throughout, is on improvised equipment; this formed a stark contrast with the luxurious conditions prevailing in American hospitals.
153. Holland, C. T., 'An address on war lessons for radiology', *Brit. med. J.*, 1920, **i**, 353-55. Scathing indictment of government failure to provide the Army with expert advice on X-ray matters. Details the areas in which radiology made significant advances during the War.

MEDICAL AND SURGICAL PROBLEMS AND TREATMENT

The books and research papers which make up most of this section have been selected to reflect the impact of disease and injury on the front-line armies.

154. Shipley, Sir A., *The Minor Horrors of War*, London, Smith, Elder & Co., 1914. A serious and informative study written with a light touch. As the war progressed it became increasingly evident that these 'horrors' were anything but minor.
 155. Ashford, B. K., *A Soldier in Science*, London, Routledge, 1934. An American pathologist on the Western Front, 1917-18.
- Dysentery*
156. Sonne, C. O., 'Über die Bakteriologie der giftarmen Dysenteriebacillen (Paradysenteriebacillen)', *Zbl. Bakt.*, 1915, 1 Abt., **75**, Orig., 408-56. Sonne drew attention to a bacillus, since named after him (*Shigella sonnei*), which causes dysentery.
 157. Schmitz, K. E., 'Ein neuer Typus aus der Gruppe der Ruhrbazillen als Erreger einer grösseren Epidemie', *Z. Hyg. Infektkr.*, 1917, **84**, 449-516. Description of a bacillus (*Shigella Schmitzii*) which carries dysentery and is chiefly met with in India and the Sudan.

158. Vincent, H., and Muratet, L., *Dysentery, Asiatic Cholera and Exanthematic Typhus*, London, University of London Press, 1917. Dysentery, (especially in its bacillary form) was the armies' greatest scourge. Cholera was fought off by means of preventive inoculation and hygiene. Typhus troubled the native corps much more than the British.
159. Andrews, Sir F. W., 'Dysentery bacilli: the differentiation of the true dysentery bacilli from allied species', *Lancet*, 1918, **i**, 560-63. Dysentery and other diarrheal diseases often accounted for more casualties than actual battle wounds. The bacillus which causes true dysentery (*Shigella alcalescens*) is here described by Andrews.

Tetanus

160. Courtois-Suffit, M., and Giroux, R., *The Abnormal Forms of Tetanus. A Clinical, Pathogenic, Prophylactic and Therapeutic Survey . . . With a Preface by Professor Fernand Widal*, edited by Surgeon-General Sir David Bruce and Frederick Golla, London, University of London Press, 1918. The universal adoption of prophylactic injections for tetanus led to certain modifications in the symptoms displayed by the disease. This book gives the first systematic account of them.

Typhus

161. Rocha-Lima, H., 'Zur Aetiologie des Fleckfiebers', *Berl. Klin. Wschr.*, 1916, **53**, 567-9. Rocha-Lima, a French physician, isolated the organism which causes typhus, one of the most deadly killers on all war fronts. *B.M.A. Library.*
162. Weil, E., and Felix, A., 'Zur serologischen Diagnose des Fleckfiebers', *Wien. Klin. Wschr.*, 1916, **29**, 33-5. The agglutination test (Weil-Felix Test) for determining the presence of typhus fever. *B.M.A. Library.*

Trench-Fever

163. Graham, J. H. P., 'A note on a relapsing febrile illness of unknown origin', *Lancet*, 1915, **ii**, 703-4. First description of trench fever, a louse-borne infection.
164. Hunt, G. H., and Rankin, A. C., 'Intermittent fever of obscure origin, occurring among British soldiers in France. The so-called "Trench-fever"', *Lancet*, 1915, **ii**, 1133-36. Soon after Graham had announced his first case of a 'relapsing febrile illness' the condition was given the name 'trench fever' by Hunt and Rankin.
165. His, W., jr., 'Über eine neue periodische Fiebererkrankung (Febris Wolhynicza)', *Berl. Klin. Wschr.*, 1916, **53**, 322-3. Trench-fever also

afflicted the Germans on the Russian front; both His and Heinrich Werner wrote descriptions of cases seen there, hence the German eponym Werner-His disease.

166. Töpfer, H., 'Zur Ursache und Übertragung des Wolhynischen Fiebers', *Münch. med. Wschr.*, 1916, **63**, 1495-96. Within one year of its first appearance trench-fever was known to be caused by a louse-borne organism, *Rickettsia quintana*. The discoverer (Töpfer) was a German physician. *Royal Society of Medicine.*
167. Wilson, R., *Doctor's Progress*, London, Eyre & Spottiswoode, 1938. British war correspondent in France and Officer in the R.A.M.C. Studied the effect of trench-fever on soldiers' hearts.

Malaria

168. Willoughby, W. G., and Cassidy, L. L., *Anti-Malaria Work in Macedonia among British Troops*, London, H. K. Lewis, 1918. From 1915 to 1918 the British Medical Services in Macedonia treated 18,000 battle wounded as against almost half a million sick and injured.
169. Armand-Delille, P., *et al.*, *Malaria in Macedonia*, London, University of London Press, 1919. Based on experience with the French Army of the East. Quinine was the main prophylactic used; mortality was remarkably low in spite of a high morbidity rate.
170. Anderson, A. G., 'Malaria in Macedonia 1915-1919. Pt. II: Clinical observations', *J. Roy. Army Med. Cps.*, 1933, **38**, 25-40.
171. War Office, *Memoranda on Some Diseases in the Mediterranean War Area, with Some Sanitary Notes*, London, H.M.S.O., 1916.

Cerebro-Spinal Fever

172. Medical Research Committee, *Bacteriological Studies in the Pathology and Preventive Control of Cerebro-Spinal Fever among the Forces during 1915 and 1916*, London, H.M.S.O., 1916. Demonstrates the inhibitory effect of saliva on the meningococcus.

Venereal Disease

173. Royal Commission on Venereal Disease, *Final Report*, London, H.M.S.O., 1916. This official report contains disturbing statistics about the prevalence of venereal disease in the armed forces and urban areas; the discussion of clinical aspects is wide-ranging and authoritative for the time when it appeared.

174. Meinicke, E., 'Eine neue Methode der serologischen Luesdiagnose', *Berl. Klin. Wschr.*, 1917, 54, 613-14. Syphilis, a disease which maimed and killed thousands of troops, was usually diagnosed by means of the 'Wassermann reaction'. This test was modified during the years following its introduction (1907); the 'Meinicke diagnostic reaction' was an important step in the process of modification. *B.M.A. Library.*
175. Thibierge, G., *Syphilis and the Army*, London, University of London Press, 1918. In this translation from the French the editor remarks that current British treatment was intravenous injection of a salvarsan 'substitute' combined with intra-muscular injections of mercury.
B.M.A. Library.
- Heart Disease*
176. Lewis, Sir T., *Reports upon Soldiers Returned as Cases of 'Disordered Action of the Heart' (DAH) or Valvular Disease of the Heart (VDH)*, London, H.M.S.O., 1917. A condition which often afflicted troops, otherwise called Da Costa's or effort syndrome.
- Psychology and Psychiatry*
177. Myers, C. S., 'A contribution to the study of shell-shock', *Lancet*, 1915, i, 316-20. The first English description of shell-shock. Myers treated his cases by hypnosis.
178. Terman, L. M., et al., *The Measurement of Intelligence . . . Guide for the Use of the Stanford Revision . . . of the Binet-Simon Intelligence Scale*, London, Harrap, 1919. The Binet system of measuring intelligence, devised and first applied in 1905, was first used by the allied armies in 1917 to test the intelligence of new recruits.
Royal Society of Medicine.
179. Viets, H., 'Shell-shock', *J. Amer. Med. Assoc.*, 1917, 69, 1779-86. A digest of the English literature.
180. 'The effect of the War upon psychiatry in England' [editorial], *Lancet*, 1917, ii, 352-53. A call for greater attention to the subject.
- 180a. Salmon, T. W., 'The care and treatment of mental diseases and war neuroses (shell-shock) in the British Army', New York, 1917. (Duplicated typescript).
181. Yerkes, R. M., 'The relation of psychology to military activities', *Ment. Hyg.*, 1917, i, 371-76.
Royal Society of Medicine.
182. Babinski, J. and Froment, J., *Hysteria or Pithiatism and Reflex Nervous Disorders in the Neurology of War*, London, University of London Press, 1918. An excellent account, with bibliography, of war-studies on hysteria and of the authors' own work.

183. Mott, Sir F. W., *Two Addresses on War Psycho-Neurosis*. (1) *Neurasthenia. The Disorders and Disabilities of Fear. Delivered before the Harveian Society of London on December 15, 1917*. (2) *The Psychology of Soldiers' Dreams. Delivered before the Psychiatric Section of the Royal Society of Medicine on January 8, 1918*, London, Lancet Office, 1918. The accumulated experience of Britain's leading practitioner in military psychiatry.
184. Roussy, G., and Lhermitte, J., *The Psychoneuroses of War*, London, University of London Press, 1918. A discussion in the main of shell-shock. Though the French had no word for this condition they were assiduous in treating it and claimed a 98 per cent recovery rate.
185. Lepine, J., *Mental Disorders of War*, London, University of London Press, 1919. By a French doctor with much experience of shell-shock, neurasthenia, depression and war neurosis.
186. War Office, Committee of Enquiry into Shell-shock, *Report*, 1922. A post-war report which deprecates the term 'shell-shock' and divides cases into three categories (1) commotional (2) emotional and (3) mental.

Gas poisoning and its treatment

The tremendous casualties among British troops by gas poisoning were occasionally compounded by British ignorance of this form of warfare. The letter to the eminent physiologist Professor Sir Edward Schäfer (exhibit 187) comments graphically on ignorance of the 'most elementary laws of physics'; the writer's 'superiors' were apparently unaware that for gas attacks to be successful 'the wind must be blowing towards the German trenches'.

The majority of the poisonous gases induced lung damage for which no drug treatment was effective. All substances tried, such as ammonia (see capsules in exhibit 189) or injections of atropine, proved useless. The only treatment generally used was rest and warmth, venesection, and particularly the administration of oxygen.

The story of oxygen treatment is particularly interesting in that it was some time before it was realized that large quantities had to be administered. The apparatus shown in exhibits 190 and 191 shows two methods for this: nitrous oxide anaesthetic apparatus, and Hal-dane's oxygen unit.

187. Letter to Professor Sir Edward Schäfer about conditions on the front.
188. Photographs of clinical signs of gas poisoning.
189. Ammonia capsules used initially for the treatment of poisons.

190. Hewitt's nitrous oxide anaesthetic apparatus suitable for administering oxygen.
 191. J. S. Haldane's unit for administering oxygen simultaneously to four patients. The apparatus is designed so that oxygen first passes into a rubber reservoir thus preventing wasting during exhalation.
 192. Bradford, Sir J. R., and Elliott, T. R., 'Cases of gas poisoning among the British troops in Flanders', *Brit. J. Surg.*, 1915-16, 3, 234-46. Gas-attacks on British lines took place between 23 April and 24 May 1915. The Canadian and English soldiers were entirely without protection.
 193. Ministry of Munitions, *An Atlas of Gas Poisoning*, London, H.M.S.O., 1918. *Manchester Medical Library.*
 194. Chemical Warfare Medical Committee, *Reports on Chemical Warfare*, London, H.M.S.O., 1918-20. Leading physiologists of the day (e.g., L. Hill, Sir J. Barcroft, W. M. Bayliss, H H. Dale, J. S. Haldane) formed part of this Committee, whose reports were the fullest yet to appear on the pathology and treatment of gas-poisoning.
 195. Warthin, A. S., and Weller, C. V., *The Medical Aspects of Mustard Gas Poisoning*, London, Kimpton, 1919. *Royal Society of Medicine.*
 196. Simon, L., *Grande inquiétude, ou la nation sous les gaz: détection et neutralisation*, 1931. Methods of detecting and neutralizing poison gases, with photographs of mainly German wartime equipment.
- Surgery (general treatment of wound infection, blood transfusion, etc.)*
197. 72 watercolour drawings by Sir Henry Tonks showing facial injuries and their repair. Each c. 20 x 15 cm. *Royal College of Surgeons.*
 198. Photograph of Sir Henry Tonks. *Royal College of Surgeons.*
 199. An operation for appendicitis at the Military Hospital, Endell Street, London, 1917; by F. Dodd. Watercolour. 31 x 26.5 cm.
 200. Photographs showing wartime operating theatres.
 201. 'Notes on naval and military surgery, contributed by various writers', *Brit. J. Surg.*, 1914/5, 2, 449-512. Surgery in the early days of the war described by the leading French surgeon Tuffier and a variety of British writers; with references to hospitals including Dr. Blake's American Hospital at Neuilly.

202. Tuffier, T., 'Contemporary French surgery', *Brit. J. Surg.*, 1915-16, 3, 100-112. By the leading French military surgeon. The section of war surgery gives a 'state of the art' for an early period of the war. Tuffier was war surgeon to the Hertford Hospital, Paris, for 20 years.
203. Leriche, R., 'De la causalgie envisagée comme une névrite du sympathique et de son traitement par la dénudation et l'excision des plexus nerveux périartériels', *Presse méd.*, 1916, 24, 178-80. Leriche, a French surgeon, introduced the operation of periarterial sympathectomy as a means of eliminating pain resulting from peripheral nerve wounds.
Royal Society of Medicine.
204. Dolamore, W. H., *The Treatment in Germany of Gunshot Injuries of the Face and Jaws*, London, British Dental Association, 1916. Translated and abstracted from the recent German literature.
205. Tinel, J., *Les blessures des nerfs*, Paris, Masson & Cie, 1916. Gunshot wounds of peripheral nerves were a common feature of World War I, as indeed of all wars. The effects of such wounds were studied most closely by Tinel.
206. Souttar, H. S., 'Injuries of the peripheral nerves from the surgical standpoint', *Brit. J. Surg.*, 1918-19, 6, 279-314. A careful account of experience with 128 cases, showing his operative methods and a wide range of post-operative treatments.
207. (a) Carrel, A., *et al.*, 'Traitement abortif de l'infection des plaies', *Bull. Acad. Méd. (Paris)*, 1915, 3 sér., 74, 361-68. *B.M.A. Library.*
(b) Dakin, H. D., 'On the use of certain antiseptic substances in the treatment of infected wounds', *Brit. med. J.*, 1915, ii, 318-20. The most effective antiseptic for severe war wounds was a solution of chlorinated soda and sodium bicarbonate. It was named the Carrel-Dakin solution after the two men who collaborated in discovering it.
208. Wright, Sir A. E., *Wound Infections and Some New Methods for the Study of the Various Factors which come into Consideration in their Treatment*, London, University of London Press, 1915. Hypertonic salt solutions were used by Wright to facilitate wound repair. They intensified the natural process of lymph-flow from the wound surfaces.
209. Morison, J. R., 'The treatment of infected suppurating war wounds', *Lancet*, 1916, ii, 268-72. Another weapon against infection used by the British was bismuth iodoform paraffin paste, or 'bipp'. This paper describes its first use.

210. Carrel, A., and Dehelly, G., *The Treatment of Infected Wounds*, London, University of London Press, 1917. A full description of the famous Carrel-Dakin method.
211. Dakin, H. D., and Dunham, K., *A Handbook on Antiseptics*, New York, Macmillan, 1917. *Royal Society of Medicine.*
212. Fleming, A., 'The action of chemical and physiological antiseptics in a septic wound', *Brit. J. Surg.*, 1919-20, **7**, 99-129. Fleming, the discoverer of penicillin, was assistant to Almroth Wright and a co-protagonist for the principle of encouraging wounds to recover naturally.
213. Gray, H. M. W., 'Treatment of gunshot wounds by excision and primary suture', *Brit. med. J.*, 1915, **ii**, 317. Débridement, or massive excision of wounded and infected tissue, was a procedure which went back to the 18th century. It was revived during the war as a result of traditional antiseptics being proved virtually useless under battle conditions.
214. Hustin, A., 'Note sur une nouvelle méthode de transfusion', *Bull. Soc. roy. Sci. méd. Brux.*, 1914, **72**, 104-11. Demonstrates the effectiveness of sodium citrate and glucose in preventing blood coagulation. *Royal College of Surgeons.*
215. Lewisohn, R., 'A new and greatly simplified method of blood transfusion. A preliminary report', *Med. Rec. (N. Y.)*, 1915, **87**, 141-42. Simultaneously with Agoté in South America, Lewisohn made a successful transfusion of citrated blood between two humans. *B.M.A. Library.*
216. Robertson, B., 'The transfusion of whole blood', *Brit. med. J.*, 1916, **ii**, 38-40. Survey of the methods then in use, and a report of four cases at the Front.
217. Salant, W., and Wise, L. E., 'The action of sodium citrate and its decomposition in the body', *J. biol. Chem.*, 1916, **28**, 27-58. An article which demolished the suspicion that citrated blood was dangerous; the authors proved that the citrate is destroyed in the body within ten minutes.
218. Fullerton, A., *et al.*, 'Observations on direct transfusions of blood, etc.', *Lancet*, 1917, **i**, 715-19. Direct transfusion at a Base Hospital, using a thin rubber tube with a silver cannula at either end, and coated on the inside with paraffin wax to discourage clotting.

219. Robertson, O. H., 'A method of citrated blood transfusion', *Brit. med. J.*, 1918, i, 477. Introduction of the citrate method to Casualty Clearing Stations, by a Canadian Medical Officer.
220. Beatson, Sir G. T., *How the Wounded-Disabled Soldier is Treated Surgically at Scotland's Orthopaedic Centres*, Glasgow, British Red Cross Society (Scottish Branch) [1917]. A short account of physical methods in the Scottish National Red Cross Hospital, Bellahouston.
221. Jones, Sir R., *Notes on Military Orthopaedics*, London, 1917. Sir Robert Jones served with distinction in the British Army's medical services. He was a former pupil of Hugh Owen Thomas whose splints were widely adopted by the military.
222. Krukenberg, H., 'Eine neue osteoplastische Amputationsmethode des Oberschenkels', *Zbl. Chir.*, 1917, 44, 578. A new cineplastic amputation whereby the stump retains the ability to make movements.
Royal College of Surgeons.
223. Willems, C., 'Mobilisation active immédiate pour les plaies de guerre, du genou et du coude', *Bull. Acad. Méd.*, 1917, 3 s, 77, 394-401. Article by a Belgian advocating the revolutionary idea that wounded joints often react well if the patient is allowed to use them soon after treatment.
B.M.A. Library.
224. Broca, A., *The After-Effects of Wounds of the Bones and Joints*, London, University of London Press, 1918. Translated from the French, and part of the Military Medical Manuals series.
225. Albee, F. H., *A Surgeon's Fight to Rebuild Men*, London, R. Hale, 1950. Bone-grafting and orthopaedic surgery (see exhibit 339).
226. Begg, R. C., *Surgery on Trestles*, Norwich, Jarrold, 1967. Campaigns in the Middle East.
227. Martin, A. A., *A Surgeon in Khaki*, London, Arnold, 1915. Field ambulance and surgical specialist No. 6 Hospital Rouen.
228. Souttar, H. S., *A Surgeon in Belgium*, London, Arnold, 1915.

A SELECTION OF PAINTINGS, COLOURED PHOTOGRAPHS, DRAWINGS AND ARTICLES ON NAVAL MEDICINE

229. Action operating theatre in a battle ship, by J. Gordon. Oil. 99.5 x 120.2 cm.

230. Soldiers saving wounded sailors from the sea. Charcoal drawing. 45.2 x 73.5 cm.
231. Wounded after Jutland on board Royal Naval Hospital Ship *Plassy*. Photograph. 51.4 x 71 cm.
232. Naval Ambulance Train. Coloured photograph. 59.7 x 75 cm.
233. Operation on Turkish Prisoner of War in Royal Naval Armoured Car. Coloured photograph 49.5 x 72.5 cm.
234. Ward of Royal Naval Hospital Ship *Berbice*. Coloured photograph. 49.1 x 75 cm.
235. Dressing station of H.M.S. *Erebus Monitor*. Coloured photograph. 57 x 72.5 cm.
236. Dressing Station of H.M.S. *Barham*. Photograph. 59.5 x 82.4 cm.
237. Dressing Station of H.M.S. *Marlborough*. Coloured Photograph. 59.5 x 75 cm.
238. Royal Naval Armoured Cars; ambulance breakdown in the Caucasus. Coloured photograph. 52 x 76 cm.
239. Medical Research Committee. *A Report upon the Seasonal Outbreak of Cerebrospinal Fever in the Navy at Portsmouth, 1916-17*, London, H.M.S.O., 1917 (see exhibit 172). *Manchester Medical Library*.
240. Hopkins, W. K., 'The naval action off Heligoland', *J. Roy. Nav. Med. Serv.*, 1915, **1**, 25-30. An action fought on 28 August 1915 in which 27 cases were treated.
241. Cheyne, Sir W., Bassett-Smith, P. W., and Edmunds, A., 'Preliminary report of a Committee [on] the best method of treating wounds', *J. Roy. Nav. Med. Serv.*, 1915, **1**, 103-42. As a result of these investigations into antiseptics the Naval Hospitals were issued with a combination of dorsal in pepper-pots and cresol in tubes.
242. Hornabrook, R. W., 'A simple and safe somnoform or ethyl chloride inhaler for minor operations', *J. Royal. Nav. Med. Serv.*, 1915, **1**, 270-81. With interesting photographs of anaesthetic equipment.

243. Willan, R. J., 'Surgical technique on board the Royal Naval Hospital Ship *Drina*', *J. Roy. Nav. Med. Serv.*, 1915, **1**, 412-30. The photographs show how scrupulously clean the operating conditions of this ship were.
244. Cheyne, Sir W., 'A trip to the Dardanelles', *J. Roy. Nav. Med. Serv.*, 1916, **2**, 137. First experimental application in the Navy of the hypochlorite solution devised by Carrel and Dakin.
245. Ross, J. N., 'Medical impressions of the Gallipoli campaign', *J. Roy. Nav. Med. Serv.*, 1916, **2**, 313-24. The author describes how he treated dysentery, diarrhoea, typhoid, jaundice, trench fever, paratyphoid, frost bite, nephritis and mental upsets amongst Royal Marines.
246. MacLean, A., 'Surgical experiences in the Battle of Jutland', *J. Roy. Nav. Med. Serv.*, 1916, **2**, 421-25.
- 246a. 'Medicine and the sea affair', *Brit. med. J.*, 1917, **i**, 533-48. An outline of work of the Royal Naval Medical Service with sections on pathology, surgery, hygiene, hospital ships and land medical transport.
247. Rolleston, H. D., 'An address on Naval medicine in the Great War', *Lancet*, 1917, **i**, 255-59. An excellent account of the Navy's health in wartime, and of its health services.
248. Schlesinger, E. G., 'The Carrel-Dakin method of treating infected wounds', *J. Roy. Nav. Med. Serv.*, 1917, **3**, 275-293. Encouraging results of the Carrel-Dakin method, with illustration of apparatus.
249. Ross, J. N., 'With a Royal Marine Battalion in France', *J. Roy. Nav. Med. Serv.*, 1917, **3**, 465. Includes a vivid description of the medical procedures and routines during an infantry attack on enemy trenches.
250. Hill, R., 'Influenza in the Grand Fleet', *J. Roy. Nav. Med. Serv.*, 1919, **5**, 142-49. 10,313 out of 90,000 men were treated in the spring of 1918; quinine was considered the only effective drug at hand (see exhibits 284-85).
- 250a. A Group of German naval documents illustrating medical care of service personnel under wartime conditions. The papers relate to the care and use of gas masks, treatment of nervous deafness, medical experiences on board S.M.S. "Bayern", sudden change of atmospheric pressure as a cause of death in action, the supply of artificial teeth, and the organisation of sanitary services during actions at sea.

AVIATION MEDICINE

251. The wounded airman (anon.). Grey wash. 30.3 x 44.7 cm.
252. Camus, J., and Nepper, 'Mesure des réactions psychomotrices des candidats à l'aviation', *Paris méd.*, 1916, 6, 290-94. Camus and Nepper suggested certain methods for use in the psychological examination of candidates for the French Air Force. Selection points were set up about this time in a number of military hospitals.
Royal Society of Medicine.
253. *Larousse Médical de Guerre*, Paris, Librairie Larousse, 1917. An alphabetical encyclopaedia with over 500 illustrations. The article on aviation medicine is accompanied by photographs and instruments.
254. Binet, L., 'Le mal des aviateurs et la sélection des pilotes militaires', *Rev. gén. sci. pures app.*, 1917, 28, 540-45. Binet drew attention to the physiological problems of aviation and played an important part in setting up the first low pressure laboratory at St. Cyr.
255. Anderson, H. G., 'Aeroplane accidents', *J. Roy. Nav. Med. Serv.*, 1918, 4, 51-68. Classifies causes of accidents and outlines a scheme for first-aid at air stations.
256. Dudley, S. F., 'Active service flying: the medical point of view', *J. Roy. Nav. Med. Serv.*, 1918, 4, 131-40. Discusses such things as loss of nerve, the need for oxygen at high altitudes (only recently recognized), cold, the danger of stimulants and typical wounds or sicknesses suffered in the air.
257. Etienne, G., and Lamy, 'Le coeur des aviateurs', *Bull. Acad. Méd.*, 1918, 3 s., 80, 151-53. One of a series of papers in which the authors demonstrate the effects of high altitude on the heart. *B.M.A. Library.*
258. Medical Research Committee, *The Oxygen Needs of Flying Officers*, London, H.M.S.O., 1918. The first report of the Air Medical Investigation Committee. Later ones described respiratory tests designed to determine pilots' ability to withstand high altitudes, flying stress, etc.
259. 'Medicine and aviation' [leading article], *Lancet*, 1918, ii, 821-22. Occasioned by the report of the Civil Aerial Transport Committee, this article calls for an application to civil aviation of the lessons learned by the medical services of the Air Force.

260. Garsaux, P., 'Le laboratoire à dépression atmosphérique de St. Cyr', *Compt. rendus Soc. Biol.*, 1919, **82**, 643-46. Garsaux was head of the St. Cyr Physiological Laboratory where he constructed the first apparatus for automatic supply of oxygen at high altitudes (12,500 m.).
Royal Society of Medicine.
261. Anderson, H. G., *The Medical and Surgical Aspects of Aviation With Chapters on Applied Physiology of Aviation by M. Flack . . . and the Aero-neuroses of War Pilots by O. H. Gotch*, London, Oxford University Press, 1919. The first book of its kind in English representing the fruit of four years' medical work with the Air Force.

REHABILITATION

262. Anatomy lesson at St. Dunstan's, by J. H. Lobley, 1919. Oil. 50.4 x 59.6 cm. (See also No. 268).
263. A Selection of artificial limbs. Many are similar to those produced at the Ministry of Pensions Hospital in Bath which are shown in a collection of photographs.
264. The Inter-Allied Exhibition on the After-Care of Disabled Men. Central Hall, Westminster, 20-25 May 1918. *Catalogue*. An exhibition which highlights one of the main concerns of society during inter-war years.
265. Poster advertising the activities of the French Rehabilitation Society.
266. Fox, R. F., *Physical Remedies for Disabled Soldiers*, London, Baillière, Tindall & Cox, 1917. The use of hydrology, electricity, mechanical therapy, etc. for disabled soldiers.
267. Gordon, W., 'The importance of physiotherapy in the reduction of war-disablement', *Clin. J.*, 1917, **66**, 255-8. The French methods of physiotherapy, evolved at the Grand Palais in Paris and using hydrology, heat, massage, electricity, etc., were only introduced into England on a general scale in 1916. They soon became extremely popular.
Manchester Medical Library.
268. National Institute for the Blind. *St. Dunstan's Day in Aid of Blinded Soldiers' and Sailors' After-Care Fund*, London, n.d. An appeal for funds with a description of after-care work at St. Dunstan's.

THE HEALTH AND NUTRITION OF THE CIVILIAN POPULATION

269. Advertisement for 'A. D. Pills, a cure for the ills of war bread.'
270. Advertisement for first-aid kits, headed 'Air Raids! Be Prepared'.
271. Photograph of poster: 'Breaches of the Rationing Order'.
272. Funk, C., *Die Vitamine*, Wiesbaden, J. F. Bergmann, 1914. The study of vitamins—word coined by Funk in 1911 when investigating beriberi, scurvy and rickets—was of very recent origin. Only two years before the war Gowland Hopkins had shown the need for fresh milk in diet.
273. Goldberger, J., *et al.*, 'The treatment and prevention of pellagra', *U.S. Publ. Hlth. Serv. Rep.*, 1914, 29, 2815. An early paper from Goldberger's research on deficiency diseases in which the cause of pellagra is shown to be lack of a specific vitamin. *B.M.A. Library*.
274. Board of Education, *Economy in Food: Some Suggestions for Simple and Nourishing Meals for the Home*, London, H.M.S.O., 1915. An appeal to eat less meat with advice on how to cook cheese, peas, lentils, eggs and nuts.
275. Carlson, A. J., *The Control of Hunger in Health and Disease*, Chicago, University Press, 1916. Carlson made important studies on the nature of hunger-contractions (1913). Here he discusses ways of controlling hunger.
276. Medical Research Committee, *An Inquiry into the Composition of Diets; with Special Reference to the Diets of Munition Workers*, London, H.M.S.O., 1917. A report designed to guide the government in its attempt to work out a scheme for rationing food.
277. Wood, T. B., *The National Food Supply in Peace and War*, Cambridge, University Press, 1917, Written to acquaint the public with the true and serious facts of the situation.
278. Goudiss, C. H., and Goudiss, A., *Foods that will Win the War and how to Cook Them*, New York, 1918. A nutrition-cum-cookery book published at a period of the war when certain basic foods were at a premium.
279. McCollum, E. V., *The Newer Knowledge of Nutrition*, New York, Macmillan, 1918. The search for vitamins involved scientists in all the main belligerent nations. The new knowledge obtained during

the war was summed up by McCollum. He himself had shared in the discovery of fat-soluble vitamin A in butter-fat and egg.

280. Berlin Medical Society, *The Starving of Germany*, Berlin, 1919. Horrifying and indignant accounts by German medical men about the low nutritional state of the people.
281. Medical Research Committee, *Report on the Present State of Knowledge Concerning Accessory Food Factors (Vitamins)*, London, H.M.S.O., 1919. Presents the essential facts on this new subject as they were then known.
282. Ministry of Munitions, *Health of the Munition Worker. Handbook prepared by the Health of Munition Workers' Committee*, London, H.M.S.O., 1917. The advice in this manual is based on close statistical analysis of numerous cases of industrial fatigue; its appearance in 1917 reflects increasing concern about civilian health.
283. Medical Research Committee, *The Mortalities of Birth, Infancy and Childhood*, London, H.M.S.O., 1918. Expresses doubts about the alleged benefits of ante-natal clinics, and recommends a greater emphasis on re-housing.

Influenza

It has been estimated that more than 21 million people in the world died as a result of the 1918-19 influenza pandemic. The epidemic came in two waves, starting almost simultaneously in China, Japan and the United States.

The first wave, in spring 1918, was mild. American troops in French base ports were the first to show signs of the disease. By April the French, British and German armies were infected and, by June, parts of South America and India, as well as England, also.

The second wave struck in the autumn of 1918 and spread throughout the world with devastating effects. Clinical signs of this by now much more virulent infection were acute pulmonary inflammation, leading to lung edema, and bronchopneumonia. Widespread malnutrition and fatigue caused these symptoms to be even more severe than they would otherwise have been. In Scotland alone, between July 1918 and April 1919, deaths amounted to 17,575.

284. Medical Research Council, *Studies of Influenza in Hospitals of the British Armies in France, 1918*, London, H.M.S.O., 1919. A collection of statistics and case reports presented as part of the national effort to understand how and why the 1918 influenza pandemic occurred.

285. Ministry of Health, *Report on the Pandemic of Influenza 1918-19*, London, H.M.S.O., 1920. A thorough discussion of the disastrous epidemic. Over two million people in Europe alone died from the infection.

ADVANCES IN THE MEDICAL SCIENCES MADE DURING THE WAR PERIOD

The Official History of the War includes a 'statement of new apparatus and methods of treatment adopted during the war' (exhibit 286). By and large the list indicates singularly few advances. However there was another side to the war; the research which continued in countless laboratories away from the front (some of it, nevertheless, motivated by war-time problems). All nations took part in the continuous struggle to advance medical knowledge, as can be seen from the selection of books and articles which are exhibited to illustrate this activity. They include various 'classics' such as Babkin's book on digestion and Dale's work on the choline-esters.

286. 'Statement of new apparatus and methods of treatment adopted during the war' from *The Official History of the War*.

Physiology

287. Bayliss, Sir W. M., *Principles of general physiology*, London, Longmans Green, 1915. This book was one of the most important physiology texts in its day. Its author was a proponent of the theory that hormones control many bodily processes.
288. Trendelenburg, P., 'Physiologische und pharmakologische Versuche über die Dünndarmperistaltik', *Arch. exp. Path. Pharmac.*, 1917, **81**, 55-129. Classic experiments to determine the physiology and pharmacology of peristalsis.
289. Howell, W. H., and Holt, L. E., 'Two new factors in blood coagulation—heparin and proantithrombin', *Amer. J. Physiol.*, 1918-19, **47**, 328-41. Howell's discovery of heparin had decisive long term effects in the science of cardiology, for it was eventually put to clinical use in 1936 as an anticoagulant.
290. Starling, E. H., *The Linacre Lecture on the Law of the Heart*, London, Longmans Green, 1918. Starling collaborated with Bayliss in his work on hormones. He also contributed significantly to research aimed at elucidating the heart's work and output. In this respect his law (Starling's Law of the Heart) was of the greatest importance.

Manchester Medical Library.

Endocrinology

291. Babkin, B. P., *Die äussere Sekretion der Verdauungsdrüsen*, Berlin, J. Springer, 1914. Endocrinology is virtually a 20th century science. Two British pioneers were Bayliss and Starling. Babkin's textbook was one of prime importance for the physiology of the digestive glands.
292. Cannon, W. B., *Bodily Changes in Pain, Hunger, Fear and Rage*, New York, D. Appleton, 1915. Cannon had studied the stomach's movements with the aid of X-rays and bismuth meal. In the book displayed here he went further and showed how the endocrine glands can be affected by the emotions.
293. Cannon, W. B., 'Experimental hyperthyroidism', *Amer. J. Physiol.*, 1915, **36**, 363–64. Cannon and his colleagues produced exophthalmic goitre in a cat and subsequently arrested the disease by removing the thyroid.

Genetics

294. Pearson, K., *On the Handicapping of the First-Born*, London, Dulau, 1914. Pearson and his teacher Galton founded the statistical science of biometrics. He pointed out in his book that the first-born tends to be weaker than its younger siblings and saw a contradiction between society's attempts to improve health and nature's law of survival of the fittest.
University College.
295. Morgan, T. H., *et al.*, *The Mechanism of Mendelian Heredity*, New York, H. Holt, 1915. Morgan was awarded the Nobel Prize in Medicine (1933) for his work in the field of genetics. This book is a landmark; it reports observations on the fruit-fly *Drosophila melanogaster* out of which came a much increased understanding of chromosomes.
Manchester Medical Library.
296. Pearl, R., *Modes of Research in Genetics*, New York, Macmillan, 1915. Pearl was a leading geneticist; his book shown here sums up the state of research in 1915 and talks in retrospect about the former division between the biometricians and the supporters of Mendelian genetics.
Royal Society of Medicine.

Neurophysiology

297. Dale, Sir H. H., 'The action of certain esters and ethers of choline, and their relation to muscarine', *J. Pharmacol.*, 1914, **6**, 147–90. Dale and Loewi were to share the Nobel Prize for their work on the chemical transmission of nerve impulse. This paper describes the physiological action of choline-esters.

298. Ewins, A., 'Acetylcholine, a new active principle of ergot', *Biochem. J.*, 1914, **8**, 44-9. Ewins was Dale's co-worker in the Wellcome Physiological Laboratories. He was responsible for isolating acetylcholine from ergot.
299. Weed, L. H., 'Studies on the cerebro-spinal fluid. The pathways of escape from the subarachnoid spaces with particular reference to the arachnoid villi', *J. med. Res.*, 1914, **31**, 51-117. Weed began his research work on cerebrospinal fluid in Cushing's laboratory. He succeeded in tracing and mapping out the routes taken by this fluid from its origin in the choroid plexus.
300. Gaskell, W. H., *The Involuntary Nervous System*, Part 1, London, Longmans Green, 1916. Gaskell's influence on neurophysiology was unequalled in his time. This posthumous book is a memorial to his fundamental work on the autonomic system.
301. Head, Sir H., and Riddoch, G., 'The automatic bladder, excessive sweating and some other reflex conditions, in gross injuries of the spinal cord', *Brain*, 1917, **40**, 188-263. Head, one time editor of *Brain*, made brilliant contributions to the knowledge of pain, even submitting to experiments on himself. His studies between 1905 and 1918 were directed to a more complete understanding of sensation, and this article (also published as a book in 1918) reports on some of them.
B.M.A. Library.
302. Lucas, K., *The Conduction of the Nervous Impulse*, London, Longmans Green, 1917. The most comprehensive textbook then available on the detection of current in nerve, by a great Cambridge teacher and experimentalist.
303. Riddoch, G., 'The reflex function of the completely divided spinal cord in man, compared with those associated with less severe lesions', *Brain*, 1917, **40**, 264-402. Riddoch shares with Head much of the credit for basic discoveries on the nature and function of the spinal cord.

Pharmacology

304. Abel, J. J., *et al.*, 'Plasma removal with return of corpuscles (plasmapheresis)', *J. Pharmacol.*, 1914, **5**, 625-41. Introduction of a technique for plasmapheresis.
305. Straub, W., 'Digitaliswirkung am isolierten Vorhof des Frosches', *Arch. exp. Path. Pharmak.*, 1916, **79**, 19-29. Digitalis and its action on the isolated heart.

306. Cushny, A. R., *The Secretion of the Urine*, London: Longmans, Green, 1917. Professor at Edinburgh, and former occupant of the first pharmacology chair in Britain (Univ. Coll. London), Cushny made important discoveries on the mode of action of drugs on the secretion of urine.

Bacteriology and Virology

307. Wherry, W. B., and Lamb, B. H., 'Infection of man with bacterium tularense', *J. infect. Dis.*, 1914, **15**, 331-40. The bacillus responsible for tularemia, a disease of rodents transmitted by flies etc., was first isolated in man by Wherry and Lamb.
308. Hektoen, L., 'The influence of the X-ray on the production of antibodies,' *J. infect. Dis.*, 1915, **17**, 415-22. This paper makes plain the destructive effects of X-rays on antibodies, an important consideration when X-rays are called for in conditions of infection.
309. Twort, F. W., 'An investigation of the nature of ultra-microscopic viruses', *Lancet*, 1915, **2**, 1241-3. The original discovery of the bacteriophagic (Twort-d'Herelle) phenomenon.
310. Cleland, J. B., *et al.*, 'On the transmission of Australian dengue by the mosquito *Stegomyia fasciata*', *Med. J. Aust.*, 1916, **2**, 179-84, 200-5. This paper finally implicates *Aedes aegypti* rather than other species of mosquito as the carrier of Australian dengue.
311. Guillain, G., *et al.*, 'Sur un syndrome de radicule-névrite avec hyperalbuminose du liquide céphalorachidien sans réaction cellulaire. Remarques sur les caractères cliniques et graphiques des réflexes tendineux', *Bull. Soc. Méd. Hôp., Paris*, 1916, **40**, 1462-70. First description of the Guillain-Barré syndrome sometimes present in virus encephalitis.
Royal College of Surgeons.
312. Inada, R., *et al.*, 'The etiology, mode of infection, and specific therapy of Weil's disease (Spirochaetosis icterohaemorrhagica)', *J. exp. Med.*, 1916, **23**, 377-402. Japanese research-workers made many brilliant discoveries in the field of bacteriology; the above paper describes the cause of infectious jaundice and proposes a serum-therapy which was soon to be proved successful.
313. Stoddard, J. L., and Cutler, E. C., 'Torula infection in man', *Monograph 6, Rockefeller Inst. med. Res.*, 1916. Description by two Americans of a fungus infection, torulosis.
B.M.A. Library.

314. Cruchet, J. R., *et al.*, 'Quarante cas d'encéphale-myélite subaigue', *Bull. Soc. Méd. Hôp. Paris*, 1917, 3 sér., **41**, 614-6. This account of epidemic encephalitis, preceding Economo's by a few days, heralds the appearance of influenza in Europe the following year.
Royal College of Surgeons.
 315. Economo, C., *Freiherr von San Serff, Encephalitis lethargica*, London, 1931. Contains the clinical description of epidemic encephalitis originally published in 1917.
 316. Schultz, W., and Charlton, W., 'Serologische Beobachtungen am Scharlachexanthem', *Z. Kinderheilk., Originale*, 1918, **17**, 328-33. Description of a new test (the Schultz-Charlton reaction) for determining the presence or absence of scarlet fever.
Royal Society of Medicine.
- Pathology and Clinical Medicine*
317. Dejerine, J. J., *Sémiologie des affections du système nerveux*, Paris, Masson, 1914. Dejerine's classic treatise on the nervous system was the culmination of 30 years' work. He served in the Army for almost 3 years.
 318. McCarrison, Sir R., 'The pathogenesis of experimentally-produced goitre', *Indian J. med. Res.*, 1914, **2**, 183-213. McCarrison made a continuous series of observations on cretinism in India in the years leading up to the war, and also succeeded in producing the disease under laboratory conditions.
B.M.A. Library.
 319. Niemann, A., 'Ein unbekanntes Krankheitsbild', *Jb. Kinderheilk*, 1914, **79**, 1-10. First description of 'Niemann-Pick disease', a rare form of xanthomatosis characterized by disorder of lipid metabolism.
B.M.A. Library.
 320. Ritchie, W. T., *Auricular Flutter*, Edinburgh, London, W. Green, 1914. The new and important evidence in this book was produced with the aid of the recently introduced electrocardiograph.
 321. Simmonds, M., 'Über Hypophysisschwund mit tödlichem Ausgang', *Dtsch. med. Wschr.*, 1914, **40**, 322-23. Simmonds, a Hamburg physician, described three series of cases of pituitary cachexia in 1914, 1916 and 1918. The eponym Simmonds' disease was applied to this condition in 1922.
 322. Volhard, F., and Fahr, K. T., *Die Bright'sche Nierenkrankheit*, Berlin, J. Springer, 1914. Volhard describes pure nephrosis in a more complete fashion than ever before.

323. Wenckebach, K., *Die unregelmässige Herzthätigkeit und ihre klinische Bedeutung*, Leipzig, Berlin, W. Engelmann, 1914. Wenckebach did notable work on cardiac disorders. His 'Wenckebach pills', containing quinine, were extremely effective in cases of paroxysmal fibrillation.
Royal Society of Medicine.
324. Allbutt, Sir T., *Diseases of the Arteries, including Angina Pectoris*, 2 vols., London, Macmillan, 1915. Allbutt's remarks on strain as an element in the production of heart disease (1871) predated Lewis by almost 40 years. The book shown here is a cardiological classic both in style and content.
325. Keith, N. M., *et al.*, 'A method for the determination of plasma and blood volume', *Arch. intern. Med.*, 1915, 16, 547-76. This new method devised by Keith in collaboration with L. G. Rowntree and T. J. Geraghty involved the use of dyes. Keith also helped to work out the role of the capillaries in wound shock.
326. Rubin, I. C., 'X-ray diagnosis in gynaecology with the aid of intra-uterine collargol injection', *Surg. Gynec. Obstet.*, 1915, 20, 435-42. The use of X-rays in gynaecological practice was still fairly restricted when war broke out. The most notable advance thereafter was made by Rubin and independently of him by Cary, both of whom performed the first salpingographies (radiography of the uterus).
327. Erdheim, J., 'Nanosomia pituitaria', *Beitr. path. Anat.*, 1916, 62, 302-77. Erdheim described pituitary dwarfism (nanosomia pituitaria).
Royal College of Surgeons.
328. Lutembacher, R., 'De la sténose mitrale avec communication inter-auriculaire', *Arch. Mal. Coeur*, 1916, 9, 237-60. Description of a condition (Lutembacher syndrome) in which interatrial septal defects accompany mitral stenosis.
Royal College of Surgeons.
329. Queckenstedt, H. H., 'Zur Diagnose der Rückenmarkskompression', *Dtsch. Z. Nervenheilk.*, 1916, 55, 325-33. The Queckenstedt test (using a manometer) for determining whether an obstruction exists in the spinal subarachnoid space.
Royal Society of Medicine.
330. Yamagiwa, K., and Ichikawa, K., 'Über die künstliche Erzeugung von Karzinom', *Verh. Jap. pth. Ges.*, 1917, 6, 169-78, 1917, 7, 191-6. Experimental cancer research was in its infancy during World War I. One of the fundamental discoveries in this field was Yamagiwa's success in producing tar cancer in rabbits by painting them with tar products.

331. Besredka, A., *Anaphylaxie et antianaphylaxie*, Paris, Masson, 1917. Anaphylaxis, or the allergic reaction of the body to foreign proteins, was actively studied during the early years of this century, notably by Richet. Besredka, who introduced sensitized vaccines, produced one of the leading textbooks of the war period.
332. Haldane, J., 'The therapeutic administration of oxygen', *Brit. med. J.*, 1917, **i**, 181-3. Oxygen consumption in the body was studied intensively by Haldane, Barcroft and other physiologists at University College, London.
333. Schaumann, J. N., 'Etude sur le lupus pernio et ses rapports avec les sarcoides et la tuberculose', *Ann. Derm. Syph. (Paris)*, 1917, 5 sér., 357-73. Schaumann was the first to recognize the systemic nature of sarcoidosis, or lupus pernio (Besnier-Boeck-Schaumann disease).
B.M.A. Library.
334. Boyle, H. G., 'Nitrous oxide-ether outfit', *Proc. Roy. Soc. Med.*, 1917-18, **11**, Sect. Anaesth., 30. Invention of a machine for administering a continuous flow of three anaesthetic gases.
335. Eppinger, H., and Kloss, K., 'Zur Therapie der Polyzythämie', *Therap. Mh.*, 1918, **32**, 322-6. The first use of phenylhydrazine hydrochloride in polycythaemia.
336. Frey, W., 'Über Vorhofflimmern beim Menschen und seine Beseitigung durch Chinidin', *Ber. Klin. Wschr.*, 1918, **55**, 4502. Frey's work is a development of Wenckebach's (1914). It advocates quinidine as the surest means of restoring rhythm of the heart in auricular fibrillation (see exhibit 323).
B.M.A. Library.
337. Friderichsen, C., 'Nebennierenapoplexie bei kleinen Kindern', *J.b. Kinderheilk.*, 1918, **87**, 109-25. First description of a syndrome indicating acute adrenal failure due to severe infection.
Royal Society of Medicine.
338. Zondeck, H., 'Das Myxödemherz', *Münch. med. Wschr.*, 1918, **65**, 1180-2. Zondeck's is the first systematic study of the changes which occur in the heart as a result of myxoedema.

Civilian Surgery

The effects of war on surgical techniques are always important and sometimes even dramatic. The permanent gain to surgery in the civilian sphere was inestimable, not only in terms of new knowledge

won but in the stimulus which wartime experiences had given to many of the surgeons returning to their civilian hospitals.

These hospitals had continued, throughout the war, and in spite of depredations on their personnel by the more urgent needs of the military, to provide a service of surprising efficiency in far from perfect conditions. Students, including an ever-increasing number of women, went on taking qualifications in surgery, whilst—conditions apart—the work of the surgeon continued as before.

Exhibited are a few of the outstanding surgical papers from the war period. These introduced new techniques of considerable importance; it will be noticed that the persons responsible for these innovations lived and practised in three different combatant countries, and that their discoveries were reported to the world at large in spite of the constrictions of war.

339. Albee, F. H., *Bone-Graft Surgery*, Philadelphia, W. B. Saunders & Co., 1915. Albee, an American surgeon, used bone-grafts as internal splints; this book contains the sum of his experience and is a pioneer work.
340. Fothergill, W. E., 'Anterior colporrhaphy and its combination with amputation of the cervix as a single operation', *J. Obstet. Gynaec. Brit. Emp.*, 1915, **27**, 146-7. A new and more effective operation for prolapse.
341. Cushing, H. E., *Tumours of the Nervus Acusticus and the Syndrome of the Cerebellopontil Angle*, Philadelphia, W. B. Saunders, 1917. Cushing had an unrivalled experience of brain surgery and made many improvements in its techniques. He served in France with an ambulance unit from 1915 until the end of the war. *Manchester Medical Library.*
342. Jackson, C., 'Endothelioma of the right bronchus removed by peroral bronchoscopy', *Amer. J. med. Sci.*, 1917, **153**, 371-5. Jackson had a large and famous clinic in Philadelphia; he invented many new instruments for application in bronchoscopy. *B.M.A. Library.*
343. Dandy, W. E., 'Extirpation of the choroid plexus of the lateral ventricles in communicating hydrocephalus', *Ann. Surg.*, 1918, **68**, 569-79. Dandy introduced the methods of ventriculography and pneumoencephalography. This paper is one of his most important contributions to the knowledge of hydrocephalus and diseases of the ventricles. *B.M.A. Library.*
344. Finsterer, H., 'Ausgedehnte Magenresektion bei Ulcus duodeni statt der einfachen Duodenalresektion bzw. Pylorusausschaltung', *Zbl. Chir.*, 1918, **45**, 434-5. The Hofmeister-Finsterer operation for gastroenterostomy, which decreased mortality and improved the end-results.

MEDICINE AND SURGERY IN THE GREAT WAR (1914–1918)

ADDITIONAL EXHIBITS

346. Dressing station under bombardment; by A. Forest, 1918. Grey wash. 37 x 27.2 cm.
347. Australian stretcher-bearers at Messina, by Sir D. Lindsay. Grey wash. 40.8 x 34.5 cm.
348. Transport of wounded on horse cacolet, by F. Matania. Grey wash. 37 x 26.4 cm.
349. Red Cross stretcher-bearers under fire, by F. Matania, 1917. Grey wash. 34 x 28 cm.
350. German prisoners captured by Americans, passing wounded on roadside, by F. Matania, 1918. Pencil on grey wash. 34 x 27 cm.
351. Surgeon-General Sutton, R.A.M.C., (anon.). Coloured chalks. 66.9 x 39.4 cm.
352. An R.A.M.C. private with stretcher over shoulder, (anon.). Chalk drawing. 61.7 x 48 cm.
353. The Red Cross with stretcher, (anon.). Chalk drawing. 61.5 x 47.7 cm.
354. View into Red Cross train, with two stretcher-bearers, (anon.). Chalk drawing. 61.2 x 42 cm.
355. Postcards published during the War, depicting war humour, nursing, and the death of Edith Cavell.



The R.A.M.C. on parade before the outbreak of war. Note the horse-drawn ambulance of South African War type. They began to be replaced by motor ambulances during the first year of the war.

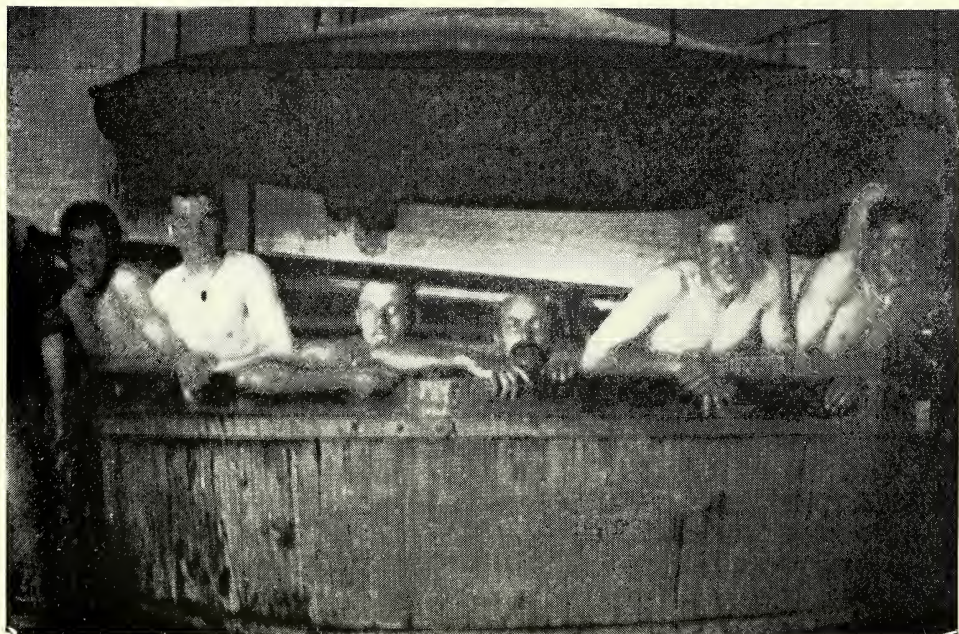
Helping a few wounded to the rear, 1917.





Water bottle filling point.

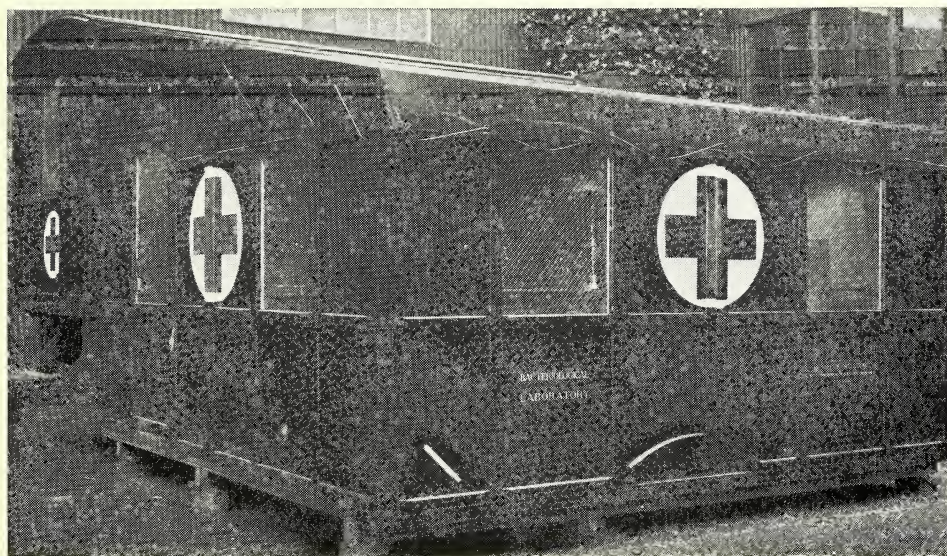
One of the baths at Pont Nieppe.

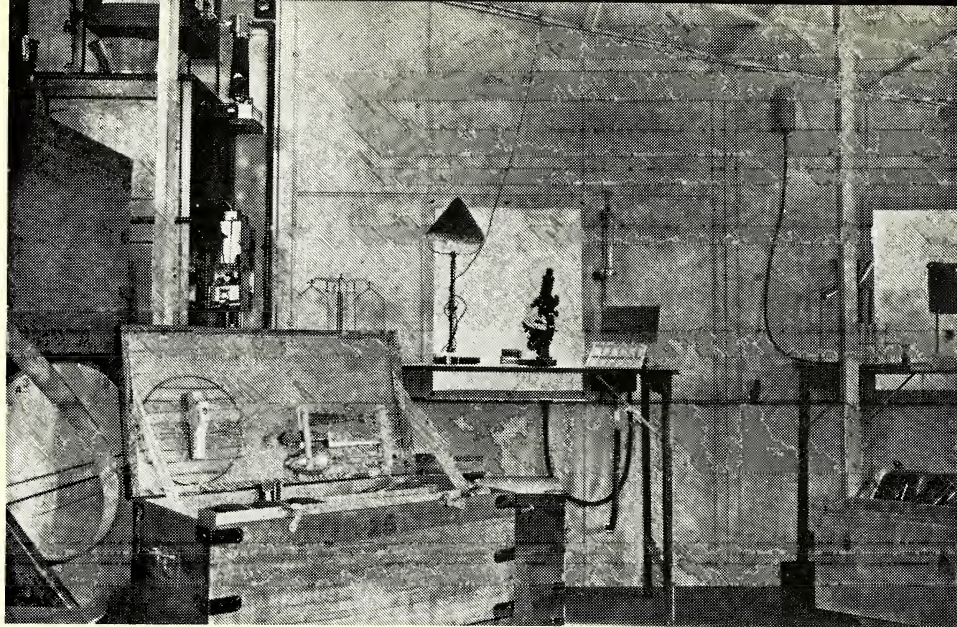




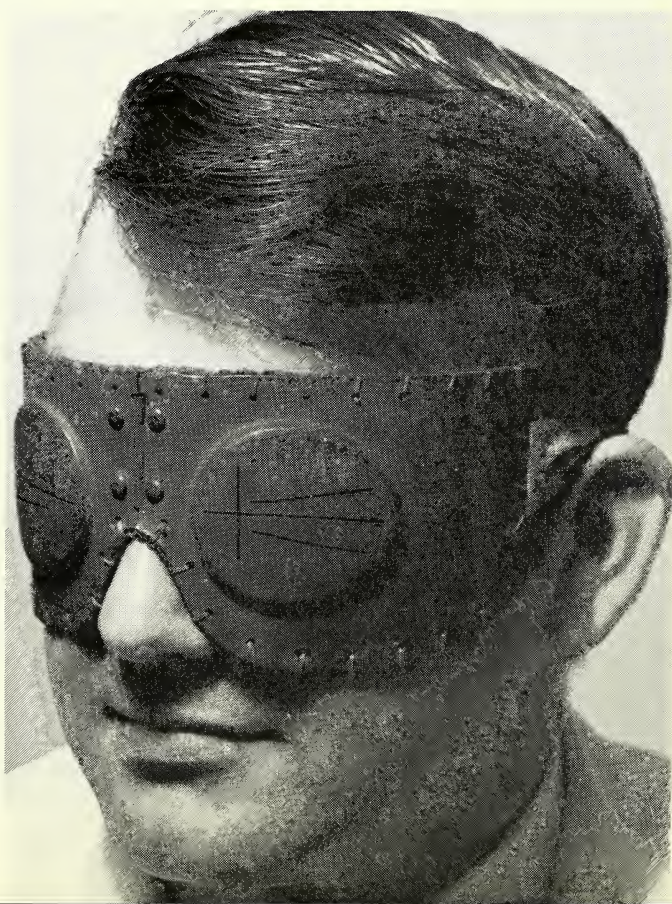
Motor bacteriological laboratory presented to the War Office by Mr. Henry Wellcome and later sent to Palestine.

The same vehicle with the extension drawn out.





An interior view of part of the Wellcome mobile laboratory.



Anti-flash and anti-splinter goggles prevented many serious eye injuries.



A tented Casualty Clearing Station just behind the Somme front.

The Royal Pavilion at Brighton was used as a hospital for Indian troops. This view of the interior shows staff and patients waiting for a visit from King George V and Queen Mary.





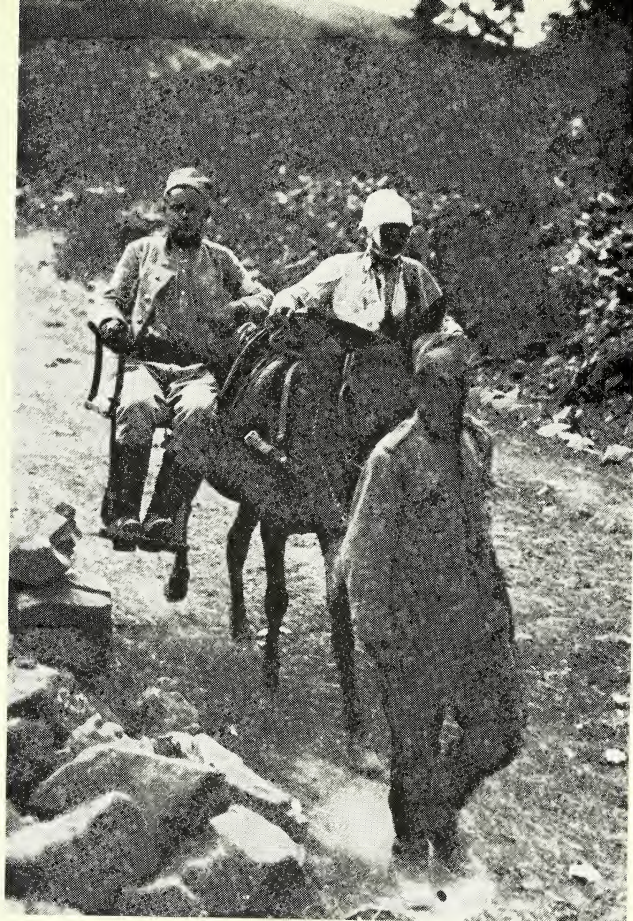
No. 105 Barge, Barge Flotillas, July 1915.

Stretcher bearers carrying a wounded soldier through the mud of Flanders.



Right

Panniers for the wounded,
Serbia, 1916.

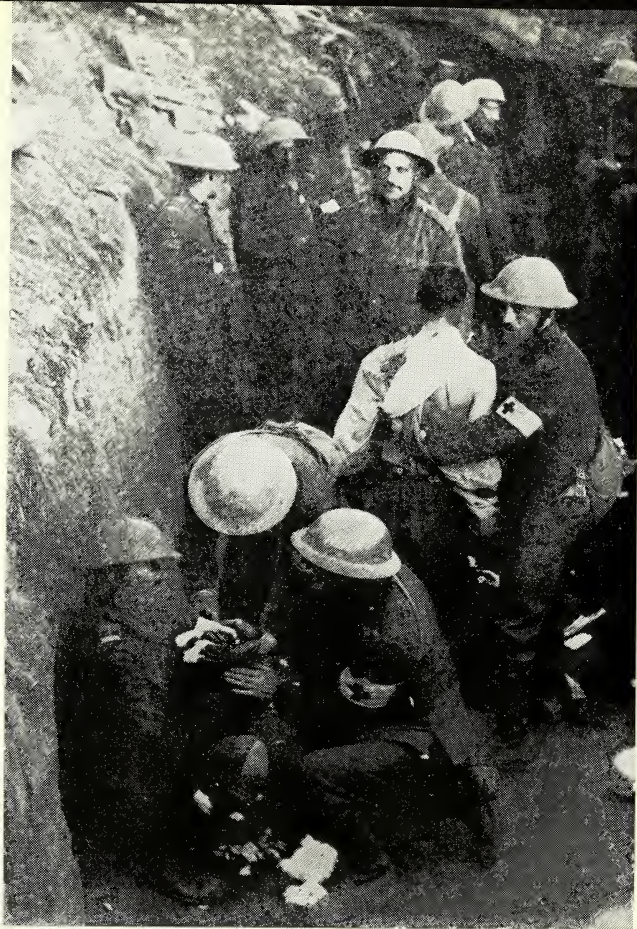


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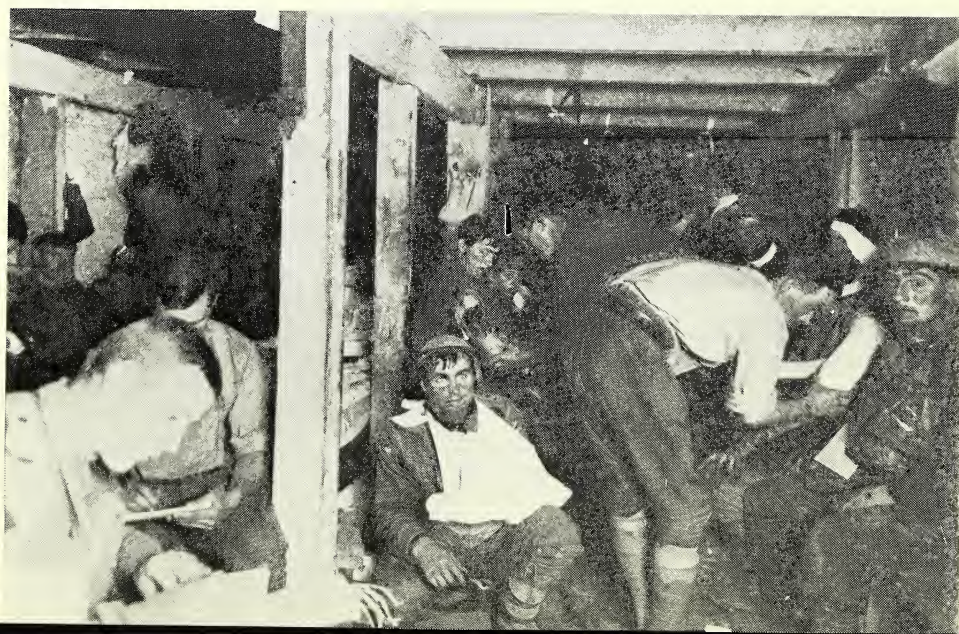
A dog of the French
Ambulance Service picking
up a fallen man's helmet to
carry back to a field orderly,
1917.



Right
Regimental Aid Post in the
trenches.



Below
Attending to wounded in a
dug-out advanced dressing
station on the Western Front.





A scene in the trenches showing stretcher bearers wearing gas masks as they carry in a man who has been gassed.

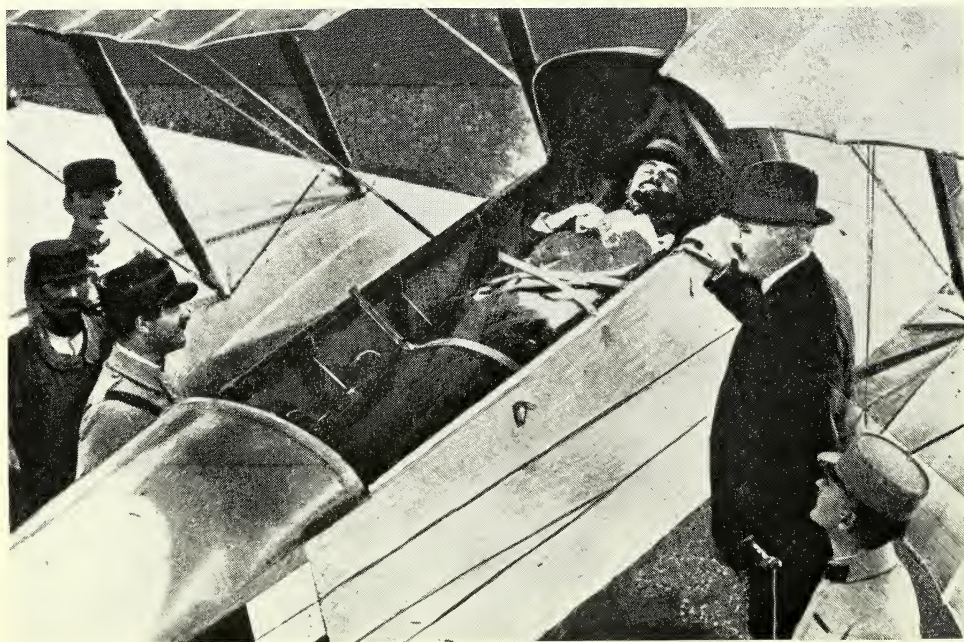
Etaples Convoy.



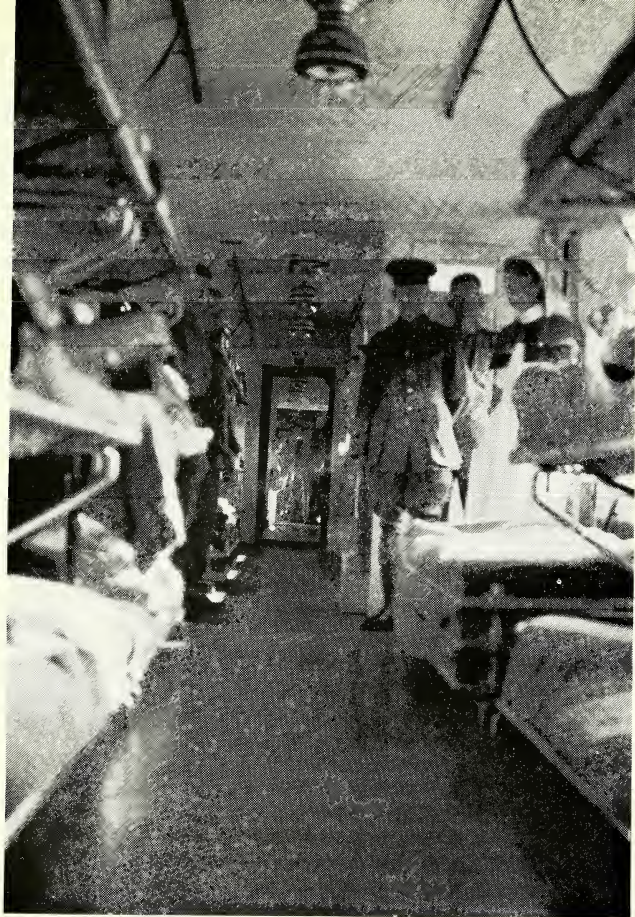


Australian wounded after the action on the night of the 4th August, 1916, being brought to a Casualty Clearing Station.

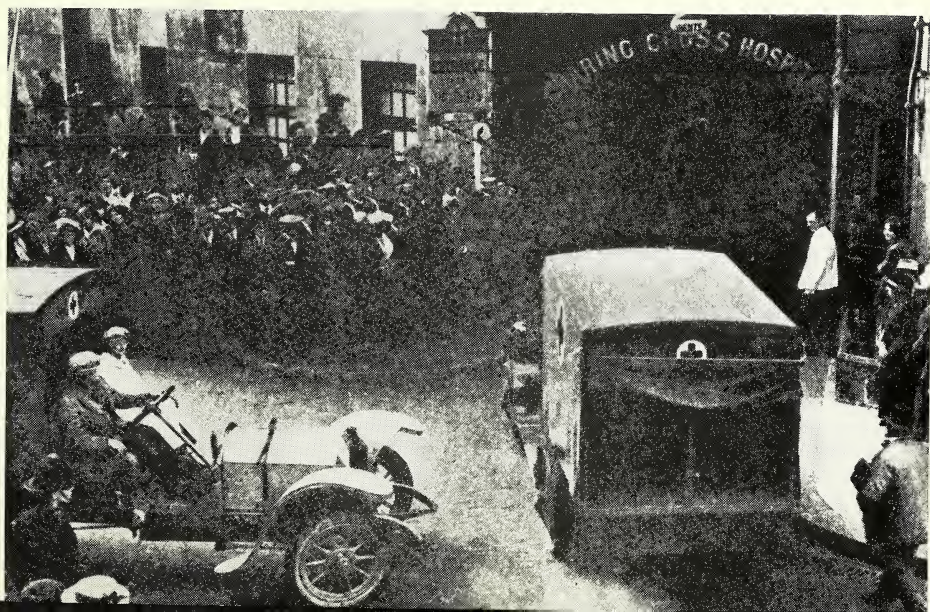
Transporting wounded by aeroplane. A rehearsal at Villacoublay.

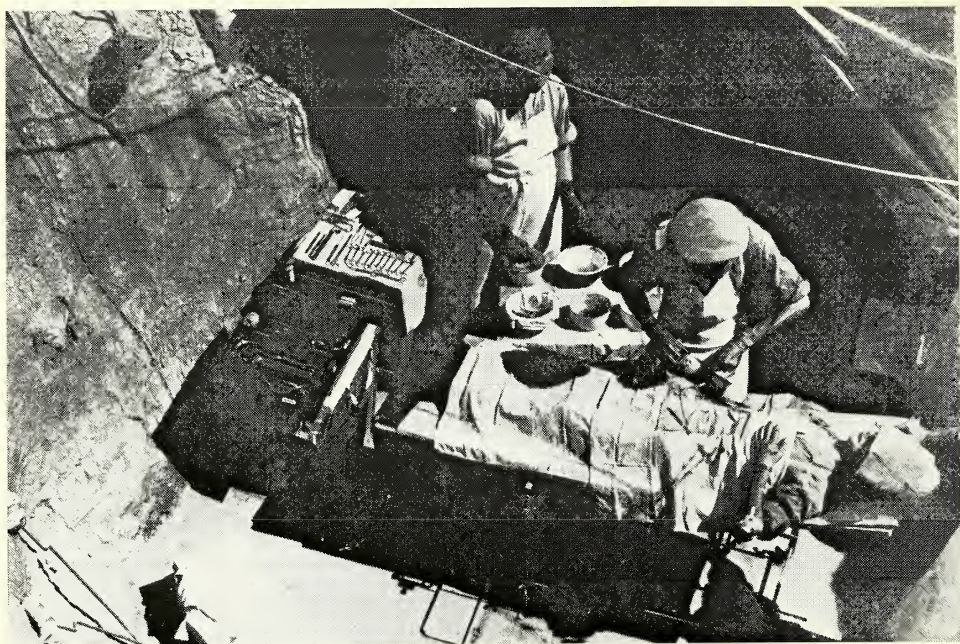


Right
Princess Christian
Ambulance Train.



Below
Crowds watch the arrival at
Charing Cross Hospital of
wounded from the front,
May, 1915.





Field Surgery in the Dardanelles, 1915.

Operating theatre at Wimereux.



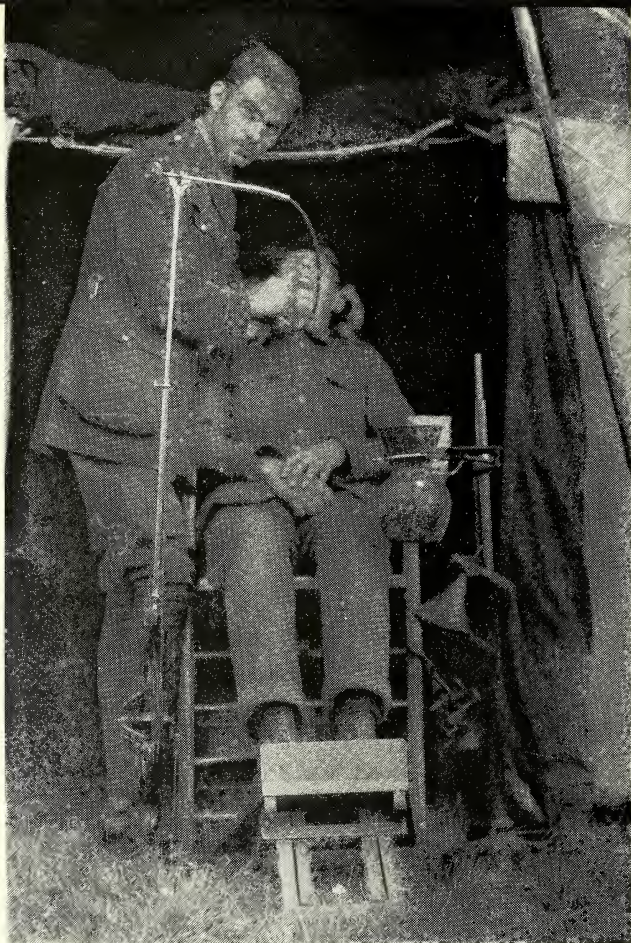


In a Russian hospital, The Czarina and her two daughters are on the right.

Searching for shrapnel with X-rays.



Right
A 'field dentist',
No. 10 C.C.S., Popperinghe.



Below
American Red Cross nurses
aboard ship.



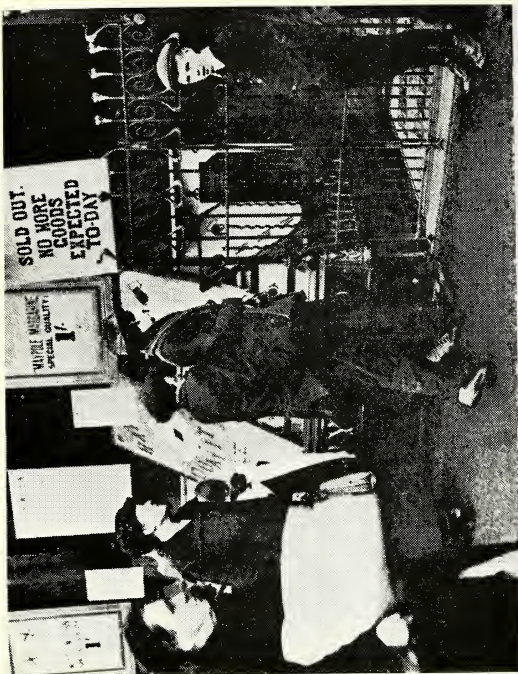


London Hospital nurses bidding goodbye to convalescent soldiers.

A patient and his 'Queen Alexandra's' nurse exchange greetings while waiting for the train to start.



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DEFENCE OF THE REALM. C.A.

MINISTRY OF FOOD.

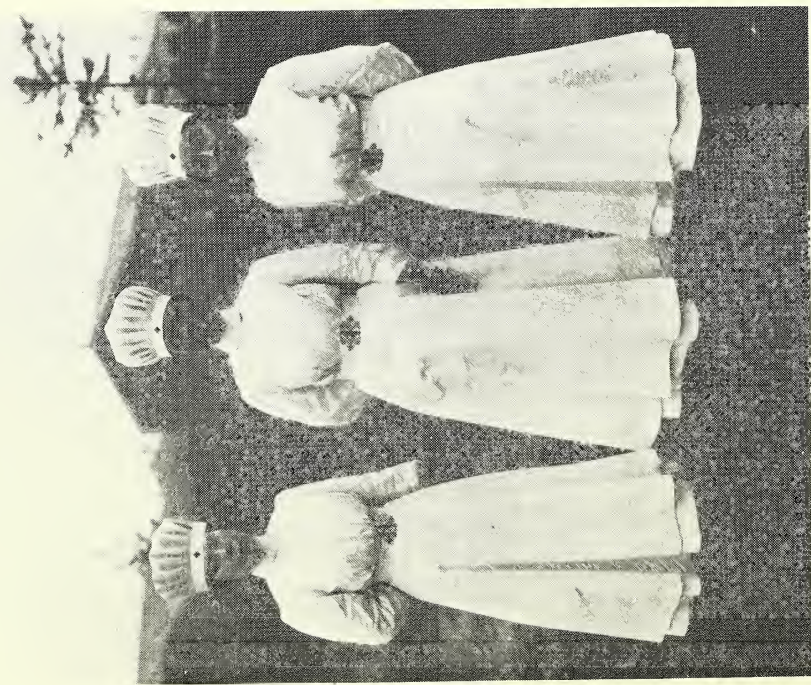
BREACHES OF THE RATIONING ORDER

The undermentioned convictions have been recently obtained:-

Court	Date	Picture of Offence	Result
RENDON	28th Aug. 1918	Unlawfully obtaining and using ration books	3 Months Imprisonment
WEST HAM	29th Aug. 1918	Being a retailer & failing to detach proper number of coupons	Fine £20
SMETHWICK	22nd July, 1918	Obtaining meat in excess quantities	Fine £20 & 25 sh. costs
OLD STREET	4th Sept., 1918	Being a retailer selling to unregistered customer	Fine £71 & 25 sh. costs
CHESTER-LE-STREET	4th Sept., 1918	Not detaching sufficient coupons for meat sold	Fine £25 & 25 sh. costs
HIGH WYCOMBE	7th Sept., 1918	Being a retailer returning number of registered customers in excess of counterfoils deposited	Fine £20 & 25 sh. costs
		Making false statement on application for and using Ration Books unlawfully	Fine £10 & 25 sh. costs

Enforcement Branch, Local Authorities Division.
MINISTRY OF FOOD. September, 1918.

A London food shop closed for lack of supplies, and below, part of a poster illustrating the rigid enforcement of rationing.



Japanese nurses at Netley.



